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USSR Report

SCIENCE AND TECHNOLOGY POLICY

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SCIENCE AND TECHNOLOGY POLICY

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ORGANIZATION, PLANNING AND COORDINATION

DECREE ON PRODUCTION SPECIALIZATION BASED ON STANDARDIZATION

Moscow STANDARTY I KACHESTVO in Russian No 4, Apr 85 pp 10-13

[Decree of the Presidium of the All-Union Council of Scientific and Technical Societies and the USSR State Committee for Standards "On the Standard Technical Support of the Expansion and Intensification of the Intersectorial and Sectorial Specialization and Cooperation of Production on the Basis of the Maximum Standardization of Assemblies and Parts"; abridged]

[Text] The firm policy of the intensive development of the economy was adopted by the 26th CPSU Congress and the subsequent CPSU Central Committee plenums. In pursuing this policy, the CPSU Central Committee and the USSR Council of Ministers by the decree "On Measures on the Acceleration of Scientific and Technical Progress in the National Economy" of 18 August 1983 specified as the main directions of the intensification of the national economy the acceleration of scientific and technical progress, the strengthening of the direct ties of science with production, the extensive introduction of automation and mechanization and the development of the specialization and cooperation of production.

The role and importance of standardization in the solution of these problems are specially emphasized in the decree. It is indicated in it that standardization is an indispensable condition of the further expansion and intensification of the specialization and cooperation of production with the extensive use of new equipment and technology. Standardization is the first and a mandatory stage in solving the problems of the specialization and cooperation of production.

The joint decree of the All-Union Council of Scientific and Technical Societies and the USSR State Committee for Standards "On the Further Development of Operations on Standardization," which was adopted on 22 December 1983, had a positive influence on the development of the operations on standardization and the intensification of scientific and technical propaganda in this area.

Definite experience in working on standardization and the specialization of production, especially on the scale of production and scientific production associations, as well as several sectors, has been gained by industry of the country.

Thus, prior to the late 1960's more than 30,000 tower cranes of about 100 type sizes were in operation for the support of housing and production construction. All-Union State Standard 13555-79 "Construction Tower Cranes. The Basic Parameters," which was formulated by the Ministry of Construction, Road and Municipal Machine Building and has been in effect since 1 January 1981, specified only eight type sizes of traveling cranes and three type sizes of attached cranes, which completely meet the needs of the national economy.

At present the Ministry of Construction, Road and Municipal Machine Building has taken the next step in the area of the standardization of tower crane building. A draft of the state standard "Construction Tower Cranes. The Specifications," which envisages the production of cranes on the basis of the modular principle and makes it possible to meet the needs of the national economy with only eight base models of cranes, has been drawn up.

Significant results in the area of standardization have been achieved in the system of the Ministry of Tractor and Agricultural Machine Building, in which in case of the output of standardized families of several types of machines the range of units, assemblies and parts has been reduced to two-fifths to one-half, while the level of specialization of their production has been increased to 27 percent.

Thus, sliding bearings, which at present are assuming in machine building greater and greater importance, are produced in the country by 12 ministries. Just the enterprises of the Ministry of the Automotive Industry, the Ministry of Tractor and Agricultural Machine Building and the Ministry of Power Machine Building produce sliding bearings in tens of millions of units without proper scientific and technical coordination. In the country there is no organization which would be responsible for the pursuit in this area of a unified technical policy.

Nominally such responsible is assigned to the Vladimir Central Design Bureau of the Ministry of the Machine Tool and Tool Building Industry and the Tambov Plant of Sliding Bearings of the Ministry of Tractor and Agricultural Machine Building. However, these organizations are not performing the indicated functions.

Shaft couplings without any production specialization are being made by both machine building and repair enterprises.

In spite of the fact that a unified dimensional series of couplings is established by the standard, the manufacturing technology at several plants does not satisfy present requirements, is labor-consuming and is accompanied by large losses of metal.

In case of the formulation of standards for series of different items quantitative methods of optimization are rarely used, which leads to the development of series of items, the production and use of which are carried out with the overstatement of the national economic calculations by 10-20 percent.

The organizations of scientific and technical societies are making a definite contribution to the promotion, development and introduction of achievements in the area of standardization. The holding of all-union conferences, meetings, symposiums and seminars, the implementation of the decisions and recommendations adopted at them, the introduction of the results of all-union competitions in industry and the holding of public appraisals of the technical level of equipment and the quality of the output being produced are conducive to this.

The Kuybyshev, Ivanovo, Chelyabinsk, Orel and a number of other oblast boards of the Scientific and Technical Society of the Machine Building Industry are performing work on public appraisals of the technical level of the output produced by enterprises and are actively participating in the certification of items and technological processes, as a result of which the shortcomings are identified and recommendations and measures on the increase of the technical level and quality of products are elaborated, the standardization of items of basic and ancillary production is carried out.

At the offices of quality, reliability and standardization attached to the republic and oblast councils of scientific and technical societies and at the corresponding consultation centers attached to industrial enterprises the work on the study and promotion of advanced know-how in the area of standardization has been stepped up.

For the purposes of the generalization of the analysis and the dissemination of theoretical and methods developments and advanced know-how in the area of the development of specialized works on the basis of the extensive standardization of components of items the All-Union Conference "The Basic Directions of the Further Expansion and Intensification of the Intersectorial Specialization and Cooperation of Production in Machine Building on the Basis of the Standardization of Assemblies and Parts," which was organized by the State Committee for Standards, the State Committee for Science and Technology, the Armenian SSR Council of Ministers, the All-Union Council of Scientific and Technical Societies, the Central Board of the Scientific and Technical Society of the Machine Building Industry, the Central Board of the Scientific and Technical Society of the Instrument Making Industry imeni Academician S. I. Vavilov and the Armenian Republic Council of Scientific and Technical Societies, was held in Yerevan on 20-21 November 1984.

The Presidium of the All-Union Council of Scientific and Technical Societies and the USSR State Committee for Standards resolve:

1. The main and base organizations for standardization, the planning and scientific research organizations of ministries and departments, the institutes of the State Committee for Standards on the basis of a structural and functional analysis and the prospects of the development of machine building and instrument making, as well as with allowance made for the positive experience, are to perform work on standardization in the directions:

--the formulation of parametric and type-size series of machines, equipment, assemblies and parts with the optimization of the series, on the basis of the procedural materials of the State Committee for Standards ("The Standard

Method of the Optimization of the Multivariate Parametric Series" of the All-Union Scientific Research Institute of Standardization and the procedural recommendations MR 4-81 "The Methods of Constructing Parametric and Type-Size Series of Parts and Assembly Units of General Machine Building Use" of the All-Union Scientific Research Institute of the Normalization of Machine Building);

--the development of promising ranges and systems of machines, equipment and instruments;

--the development of standardized sets for the subsequent unitizing and production of equipment on the basis of the modular principle;

--the development of standard items for the purpose of creating standardized families of similar products;

--the elaboration of general technical demands on products on the basis of the analysis of the conditions of their use, maintenance and repair;

--the development of standardized technological processes, including technological processes for highly specialized works for products for intersectorial use;

--the improvement of the methodology of the quantitative and qualitative criteria of the planning and the evaluation of the results of the work on standardization, including technical and economic analysis and substantiation;

--the elaboration of criteria and methods of the technical and economic substantiation of decisions on the advisability of the establishment of specialized works, as well as criteria of the grouping of products of mass use with products of intersectorial application;

--the elaboration of criteria and quantitative methods of the choice in case of the designing of machines and equipment of versions of standardized and standard components, which ensure the highest operating, technical and economic indicators of the items being designed.

2. To commission ministries of the machine building type and instrument making, based on the specific sectorial nature, on the basis of the available procedural materials and with the enlistment of the scientific and technical community and scientists (in particular, of the USSR Ministry of Higher and Secondary Specialized Education and the RSFSR Ministry of Higher and Secondary Specialized Education), on the basis of the approved lists of products, which are of the greatest national economic importance, and the lists of groups of similar products, as well as "The Basic Directions of the Further Expansion and Intensification of the Intersectorial Specialization and Cooperation of Production in Machine Building for 1986-1990 and the Period to 2000," which were elaborated by the USSR State Planning Committee and the State Committee for Standards, to ensure the scientifically sound formulation of national economic and sectorial programs of standardization and the specialization of production with the complete coverage by them of all the attached products, bearing in mind the utmost expansion of the assembly specialization of

production, especially of parts and assemblies of intersectorial and general machine building use.

3. The ministries, which are the users of machines, equipment and instruments, are to elaborate sectorial long-range requirements, which have been interconnected and submitted for approval to the producers, on standardization by types of equipment together with equipment which is being operated and repaired, which will serve as an essential basis for the reduction and subsequent elimination of duplicate developments and the decrease of operating costs and the expenditures on repair, as well as will shorten the time of its development and the production and assimilation of equipment and will eliminate the possibility of the inclusion of unsound requirements in the technical assignments for its development.

4. The need for the supplementing of the prevailing list of products of general machine building application and the inclusion in it of sliding bearings, guides of linear displacement, seals and sprockets, chains, pinions, V-belts, several types of hydraulic and pneumatic drive and a number of other items, which are used extensively in modern machine building for the purpose of the establishment of large intersectorial highly specialized works of these items of a modern technical level and high quality, as well as its attachment to the main (leading) ministries and departments, is noted in the decision.

5. The machine building ministries jointly with the State Committee for Standards are to continue the work on the development and introduction of unified design and technological classifiers and illustrated guides to them, which is necessary for the further development of the work on intersectorial standardization.

6. To organize under the State Committee for Standards a temporary interdepartmental commission with the participation of representatives of the State Committee for Science and Technology, the USSR State Planning Committee, the USSR State Committee for Labor and Social Problems, the USSR State Committee for Prices, the machine building sectors of industry and the All-Union Council of Scientific and Technical Societies for the purpose of the elaboration of suggestions on the improvement of several aspects of the economic mechanism and the system of pricing for the further expansion and intensification of the standardization of items, the intersectorial specialization of the production of assemblies and parts and shipments of them under subcontracting arrangements.

7. The territorial organs of the State Committee for Standards are to carry out the monitoring of the introduction by ministries and departments of All-Union State Standard 26197-84, All-Union State Standard 26200-84, the procedural instructions of the State Committee for Standards and the procedural recommendations of the All-Union Scientific Research Institute of the Normalization of Machine Building on questions of standardization (RD 50-350-82, RD 50-399-83, MR 4-81 and others) and to send the corresponding data annually to the All-Union Scientific Research Institute of the Normalization of Machine Building for generalization.

8. The All-Union Scientific Research Institute of the Normalization of Machine Building is to expedite the work on the further development and improvement of the scientific methods principles of standardization, on the basis of the requirements in this area, including in the area of the optimization of the construction of dimensional, type-size and parametric series and promising ranges of components of items, the quantitative evaluation of standardization, the technical and economic evaluation of the results of standardization, scientifically sound terminology and others.

9. The interested ministries and departments are to enlist the organizations of scientific and technical societies in checks of the levels of standardization in case of the designing of the most important items, checks of the work on the organization of specialized works of products of general machine building application and the assurance of shipments of them under subcontracting arrangements.

10. To recommend to the USSR Ministry of Higher and Secondary Specialized Education, the ministries of higher and secondary specialized education of the union republics to organize the training of engineers with specialization in the area of standardization and quality control: to introduce at technical higher educational institutions the teaching of the methods of standardization in the courses "Parts of Machines," "The Theory of Machines and Mechanisms"; to introduce in the course "Interchangeability, Standardization and Technical Measurements" the general principles of standardization and questions of the optimization of parametric series of items; to use extensively the principles of standardization in course and graduation projects.

11. To recommend to machine building ministries to organize at institutes of the improvement of the skills of managers and engineering and technical personnel the instruction of students in the principles of the performance of work on standardization.

12. To ask the All-Union Komsomol Central Committee to hold in 1986 the All-Union School of Young Specialists and Scientists in the Area of Machine Building and Instrument Making on the Theory, Methods and Practice of Standardization and Modular Designing.

13. The State Committee for Standards is to hold jointly with interested ministries and departments in 1986 the All-Union Scientific and Technical Conference on the Further Development of Standardization and Modular Principles in Case of the Development of New Equipment, including the questions of the use of quantitative methods of optimization and technical and economic substantiation.

14. The ministries and departments, main and base organizations for standardization, design organizations and subdivisions are to take an active part in the 5th All-Union Competition for the Best Works on Standardization, which is being conducted by the Central Board of the Scientific and Technical Society of the Machine Building Industry.

15. The All-Union Scientific Research Institute of the Normalization of Machine Building in the third quarter of 1985 is to draft and submit for

approval a plan of the preparation and publication of monographs, textbooks, lectures and other literature and posters on questions of the theory, methodology and practice of standardization for 1986-1990 for the Standards Publishing House.

16. To point out the value of the publications in the journal STANDARTY I KACHESTVO of a number of articles on questions of standardization and modular designing. To consider it necessary in the future in the journal STANDARTY I KACHESTVO, as well as in the journals of machine building sectors (VESTNIK MASHINOSTROYENIYA, TRAKTORY I SELKHOZMASHINY, AVTOMOBILNAYA PROMYSHLENNOST, STANKI I INSTRUMENT and others) to cover more extensively the theoretical and procedural problems of standardization and modular designing and the practical experience in this area.

17. The Standards Publishing House with the participation of the All-Union Scientific Research Institute of the Normalization of Machine Building is to publish during the third quarter of 1985 a collection of selected reports of the All-Union Conference on Standardization in Yerevan (November 1984).

18. It is recommended to the central boards of the Scientific and Technical Society of the Machine Building Industry, the Scientific and Technical Society of the Instrument Making Industry imeni Academician S. I. Vavilov, the Scientific and Technical Society of Radio Engineering, Electronics and Communications imeni A. S. Popov, the Scientific and Technical Society of the Shipbuilding Industry imeni Academician A. N. Krylov and the Scientific and Technical Society of Power Engineering and the Electrical Equipment Industry:

--with allowance made for the experience of the leading sectors and industrial enterprises to elaborate recommendations on the participation of the scientific and technical community in the work on standardization and to send them to the corresponding republic, kray and oblast boards of scientific and technical societies for the purpose of their use in practical work;

--to envisage in the thematic plans of the work of the boards the joint holding of intersectorial competitions, reviews, conferences and exhibitions, which contribute to the accomplishment of the intersectorial standardization, specialization and cooperation of production;

--to intensify public monitoring of the progress of the implementation of the recommendations and decisions of the held all-union conferences, meetings, symposiums and seminars, as well as the introduction of the results of the all-union competitions for the best works on standardization;

--on the basis of the corresponding committees, commissions and sections of scientific and technical societies to establish consultation centers for the purpose of the promotion of the achievements of science and technology, the experience of the leading sectors, industrial enterprises and organizations of scientific and technical societies in the area of standardization;

--to step up the work of the scientific and technical community on the fulfillment of the decree of the Presidium of the All-Union Council of

Scientific and Technical Societies and the State Committee for Standards "On the Further Development of the Work on Standardization" of 22 December 1983.

19. To assign the monitoring of the fulfillment of this decree to the Department for the Organization of the Work of Public Committees of the All-Union Council of Scientific and Technical Societies, the Machine Building Administration and the Scientific and Technical Council of the State Committee for Standards.

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ORGANIZATION, PLANNING AND COORDINATION

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EFFECTIVENESS OF MEASURES ON SCIENTIFIC, TECHNICAL PROGRESS

Moscow STANDARTY I KACHESTVO in Russian No 4, Apr 85 pp 32-37

[Article by Doctor of Economic Sciences D. S. Lvov and Candidate of Technical Sciences G. I. Mikerin, the Central Institute of Economics and Mathematics of the USSR Academy of Sciences: "On the Comprehensive Evaluation of the Effectiveness of Measures of Scientific and Technical Progress"]

[Text] From the editorial office. On 27 December 1984 the draft of the Procedural Instructions on the Comprehensive Evaluation of the Effectiveness of Measures Which Are Aimed at the Acceleration of Scientific and Technical Progress (With a Set of Interconnected Indicators of Efficiency, Which Are Formed on the Basis of Unified Principles and Take Into Account Economic, Social and Other Factors) was discussed and approved at the meeting of the section "Economic Problems of Standardization and Metrology" of the Scientific and Technical Council of the State Committee for Standards.

The need for the implementation of the basic provisions of this document in case of the elaboration of unified procedural principles of the evaluation of the effectiveness of standardization and metrological support is indicated in the decision which was adopted by the section.

For the purpose of acquainting our readers with the draft of the Procedural Instructions the article of its developers is published below.

To execute the decree of the CPSU Central Committee and the USSR Council of Ministers of 18 August 1983, "On Measures on the Acceleration of Scientific and Technical Progress in the National Economy," the commission under the chairmanship of Academician N. P. Fedorenko, which was organized by the State Committee for Standards, the USSR State Planning Committee and the Presidium of the USSR Academy of Sciences, prepared a draft of the Procedural Instructions on the Comprehensive Evaluation of the Effectiveness of Measures Which Are Aimed at the Acceleration of Scientific and Technical Progress (With a Set of Interconnected Indicators of Efficiency, Which Are Formed on the

Basis of Unified Principles and Take Into Account Economic, Social and Other Factors).[1]

The basic principles of the measurement of the socioeconomic development of the economy under the influence of scientific and technical progress were made the basis of the draft of the Procedural Instructions. There were used, generalized and developed here the principles incorporated in:

--the Method (Basic Principles) of the Determination of the Economic Efficiency of the Use in the National Economy of New Equipment, Inventions and Efficiency Proposals, which was approved by the State Committee for Standards, the USSR State Planning Committee, the USSR Academy of Sciences and the State Committee for Inventions and Discoveries in 1977;[2] the sectorial methods and instructions, which were elaborated on its basis;

--the draft of the Comprehensive Method on the Evaluation of the Efficiency of Social Production and Individual Economic Measures, which was drawn up by the Temporary Scientific and Technical Commission of the State Committee for Science and Technology and the USSR Academy of Sciences in 1983;[3] a number of procedural documents which were prepared on the basis of the Comprehensive Method.

In this connection it is necessary to note that the draft of the Comprehensive Method is to a significant extent a result of the theoretical development of the initial principles of the 1977 method. Here a noncontradictory set of indicators of efficiency for various levels and directions of economic measures was developed. Thus, the Marxist idea of the evaluation of a unified generalizing indicator of the national economic impact, which breaks down into individual particular indicators, was realized in the draft of the Comprehensive Method. The latter can be used for the purposes of economic analysis, but not as criteria of the choice of economic measures.

The integral indicator of the national economic impact, which is the difference between the economic results and the expenditures for the entire period of the implementation of the economic measure with allowance made for economic standards and social and other extra-economic restrictions, should be the criterion of choice. This signifies the priority of national economic interests over sectorial and local interests, including over those which are formed by the prevailing regulations of pricing and cost accounting. The evaluation of the national economic impact in case of the choice of economic measures of any level and any direction should be oriented toward the future, and not toward the current evaluation of activity.

In contrast to the 1977 method in the draft of the Procedural Instructions the requirements of both the national economic approach (for the choice of measures and their inclusion in the plan) and the provision of cost accounting conditions of the realization of scientific and technical achievements in production are taken into account. Thus, in this document a clear differentiation between the national economic and the cost accounting approaches to the determination of the economic impact of measures of scientific and technical progress is made and the basic differences in its determination at the different stages of the implementation of these measures

(the rated, planned and actual impacts) are given. A list of measures of scientific and technical progress is included in the draft of the Procedural Instructions, for each type of measures (according to the classification of the State Committee for Science and Technology) procedural materials, which take their specific nature into account, must be drawn up.

The methods of calculating the national economic impact of measures of scientific and technical progress are presented in sequence: from the general approach to particular cases. The need for the inclusion in the draft of the Procedural Instructions of a general method of calculating the integral economic impact with allowance made for the difference in the scale of the measures of scientific and technical progress and in the values of the accounting periods and the dynamics of the technical and economic indicators stems from the fact that not only the introduction proper of individual types or copies of new equipment, but also scientific and technical programs, large-scale measures of scientific and technical progress and the technical policy of sectors should be comprehensively substantiated.

Along with the general method of determining the integral economic impact the peculiarities of the determination of the impact of measures of scientific and technical progress for those conditions, to which the 1977 method is confined, are given in the Procedural Instructions (the design formulas, which were obtained from the general case, in final form correspond to the 1977 method).

The most important peculiarities of the evaluation of the national economic impact of scientific research and experimental design work and scientific and technical programs, including questions of the consideration of the uncertainty in case of the evaluation of the anticipated impact (special procedural documents should be drawn up for these types of measures), are reflected in the draft of the Procedural Instructions. Moreover, in this draft the basic principles of the consideration of social and ecological factors in case of the evaluation of the national economic impact are formulated and specific procedural recommendations for the most typical cases are given. The methods of considering the social and ecological factors can assume final form after the approval by the USSR State Planning Committee of the set of corresponding standards. This also applies to the economic evaluation of manpower.

The comprehensive nature of the evaluation of the effectiveness of measures of scientific and technical progress implies the need for:

1) the consideration of the economic, social, ecological, scientific and technical results of these measures, which is regulated by the set of plan indicators and standards;

2) the calculation of the effectiveness of the measures of scientific and technical progress with respect to all the stages of their implementation, including the performance of scientific research and experimental design work, the assimilation and series production of the product, as well as the period of the effective use of the results of the implementation of measures of scientific and technical progress in the national economy;

3) the consideration of the influence of the measures of scientific and technical progress on the end results of production, which requires the calculation of the efficiency over the entire interconnected technological chain with allowance made for connection of related sections of production.

The maximum economic impact in the national economy, which is the difference between the results and the expenditures for the accounting period established for the given measure (with allowance made for economic standards and other established restrictions) is the criterion of the choice of the best version of the measure of scientific and technical progress. In case of the identity of the effective results with respect to all the versions being compared the criterion of the maximization of the economic impact in the national economy corresponds to the criterion of the minimum adjusted expenditures. The cost accounting economic impact (for the purposes of planning--the planned impact, for the purposes of reporting with respect to the implemented measures of scientific and technical progress--the actual impact) is calculated for the chosen versions of measures of scientific and technical progress.

When determining the economic impact of measures of scientific and technical progress there are taken as the base of comparison:

1) at the stage of the choice of the best version--the technical and economic indicators (TEP) of the most advanced product (equipment), which provides the maximum national economic impact (in the special case, the minimum adjusted expenditures) in operating production or in the available plans (including foreign equipment, which can be purchased in the necessary quantity or can be developed in the USSR on the basis of the purchase of licenses);

2) at the stage of the determination of the cost accounting impact (planned and actual)--the technical and economic indicators of the product (equipment) which is being replaced.

Depending on the stages and conditions of the implementation of the measures of scientific and technical progress the evaluation of their effectiveness can be made from the standpoint of both the national economic and the cost accounting approach. The basic differences between these two approaches are cited in Table 1.

The rated, planned and actual economic impacts are distinguished in conformity with the basic stages of the implementation of the measures of scientific and technical progress. The basic differences in the determination of the economic impact of the measures of scientific and technical progress at the different stages of their implementation are cited in Table 2.

The nonsimultaneous nature of the expenditures and results is taken into account in the calculations of the economic impact by their reduction to the same year (base year) by means of a reduction (discount) coefficient.

Table 1

Differences Between the National Economic and Cost Accounting Approaches to the Determination of the Economic Impact of Measures of Scientific and Technical Progress

Basic conditions of the calculation of the economic impact	Approaches to the determination of the impact	
	national economic	cost accounting
Base of comparison	The most advanced technical and economic indicators (TEP) of the best of the product (or design development), which is available in our country or abroad, is in increased demand and ensures a high degree of operating economy	The technical and economic indicators with respect to the conditions of production of the product being replaced at the economic objects, at which the given measure of scientific and technical progress is being implemented
Accounting period and consideration of the time factor	The calculation for the period of the production and use of the product in accordance with the given measure. The reduction of the expenditures, results and impact, which are made and obtained during different years of the accounting period, to a single moment of time (the base year)	The calculation separately for each year as compared with the base year (the preceding year or the beginning of the planned period) without reduction according to the time factor
Spheres of the production and use of the product	The calculation jointly of the impact from the production and use of the product with respect to each measure of scientific and technical progress. In case there are several spheres of consumption, the adding up of the impact with respect to these spheres for the given measure of scientific and technical progress	The calculation separately for each cost accounting object, which either produces or uses the product with respect to the given measure of scientific and technical progress, with the subsequent determination of the consolidated cost accounting impact. The conditional rated distinction of the influence of the given measure of scientific and technical progress on the cost accounting impact of the separate object

[Table continued on following page]

Basic conditions of the calculation of the economic impact	Approaches to the determination of the impact	
	national economic	cost accounting
Standards of economic efficiency, consideration of social, ecological and other factors	The use in the calculations of a set of national economic standards of the efficiency of resources, which are used with respect to the given measure of scientific and technical progress. The consideration of extra-economic factors with respect to the restrictions being introduced in the calculations and the economic evaluations of these factors.	The use of the set of payments, standards and prices, which are used in planning and cost accounting

Table 2

The Basic Differences in the Determination of the Economic Impact of Measures of Scientific and Technical Progress at the Different Stages of Their Implementation

Stages of implementation of measures of scientific and technical progress	Basic characteristic of the used indicator of the economic impact	For the solution of what problems the given type of indicator of the economic impact is used	Notes
1. At the stage of the performance of scientific research and experimental design work (from the technical assignment to the decision on the placement of the product into production) (the rated impact)	a) the integral national economic impact for the accounting period	For the choice of versions with respect to all stages of scientific research and experimental design work, the choice of the final version in case of inclusion in the plan and for the stimulation of the developers of measures of scientific and technical progress	The anticipated (forecast) economic impact is determined in this way when formulating and substantiating the thematic plans of scientific research and experimental design work, and then is revised in the technical assignment for the project
	b) the annual national economic impact by years of the accounting period	For the finally chosen version of the measure of scientific and technical progress for the purpose of supporting current (annual) planning. For reflection in economic statistics on science and technology	It is necessary to use also when there are several spheres of consumption of the product being produced; the adding up by years of production is carried out with allowance made for the time factor (reduction)
	c) the annual cost accounting impact for the next planned year	Can be used for the choice and inclusion in the plan of production of a new product of short-term (up to 1 year) use at the same economic object at which it is produced	The stimulation of the developers in this case according to the same indicators and according to the actual impact, with the possible lead (advancing) of bonuses

[Table continued on following page]

Stages of implementation of measures of scientific and technical progress	Basic characteristic of the used indicator of the economic impact	For the solution of what problems the given type of indicator of the economic impact is used	Notes
2. At the stages of the formulation of the plans of the production, use of new equipment and the removal from production (replacement) of an obsolete product (the planned impact)	a) the annual cost accounting impact--the planned increase of the profit or decrease of the production cost (for users of the new product, for whom the quality of their own product does not change)	For the planning of the activity of individual economic units on the implementation of measures of scientific and technical progress (with the conditional rated distinction of the share of the cost accounting impact with respect to each measure)	Is the planned standard for individual economic units; can also be established as specific (special) indicators--the profitability with respect to the production cost, with respect to the fixed or all productive capital
	b) the consolidated cost accounting impact with the inclusion of elements of the national economic approach (the standards of economic efficiency, the consideration of extra-economic factors)	For the planning of the acceleration of scientific and technical progress according to the aggregate of the production and consumption of the product at all levels: enterprises (associations); sectors and regions; the national economy as a whole	In case of the aggregation of information on the consolidated impact at levels higher than enterprises (associations) not the volume of output of the commodity production, but the net output is used as the economic result (accordingly the current material expenditures are not included in the expenditures)

[Table continued on following page]

Stages of implementation of measures of scientific and technical progress	Basic characteristic of the used indicator of the economic impact	For the solution of what problems the given type of indicator of the economic impact is used	Notes
3. The stages of the actual production and use of the product at economic objects (the actual impact)	a) the annual cost accounting impact--is determined in the same way as 2a, but according to the actual data	For the evaluation of the fulfillment of the planned indicators on the implementation of measures of scientific and technical progress in individual economic units. For reflection in economic statistics	In case of the nonfulfillment of the planned indicators on the cost accounting impact a decreased proportion of material stimulation with respect to all production activity can be established
	b) the accounting (net) profit--is determined on the basis of 3a less all economic payments (including fines, penalties, forfeits and so on) in accordance with their actual amounts	For the proportionate distribution of the internal assets of the economic object, the deductions for the budget, the unified fund for the development of science and technology and other centralized or intersectorial funds. For the purpose of increasing the economic independence of enterprises (associations) this distribution should be carried out according to stable standards, which are established by directive planning organs for a 5-year period	The stimulation of the production and use of the product in accordance with individual measures of scientific and technical progress. In general, when the measure of scientific and technical progress is included in an operating production process, stimulation on the basis of the indicator of the increase of the net profit simultaneously reflects both the basic production activity and the acceleration of scientific and technical progress

The coefficient of the reduction of the expenditures, results and impact of year t to the base year t_b is designated by α_t and is determined by the formula

$$\alpha_t = (1+E_n)^{t_b-t}, \quad (1)$$

while if the base year is taken as the beginning of the report ($t_b=0$), then

$$\alpha_t=(1+E_n)^{-t},$$

where E_n is the national economic standard of reduction (discounting), which is equal numerically to the national economic standard of the effectiveness of capital investments.

If the current and one-time expenditures on a measure of scientific and technical progress are made starting with the year t=1, while the obtaining of effective results ceases in the year t=T, in general the total expenditures for the accounting period T, which have been reduced to the year $t_b=0$, are determined by the formula

$$Z_T = \sum_{t=1}^{T} (K_t+I_t-L_t)_t, \quad (2)$$

where K_t is all types of one-time expenditures on the measure in year t;

I_t is the net current costs with respect to the measure in year t (including the economic evalution of natural resources and the set contributions to the state budget to finance social insurance benefits, exclusing the renovation deductions with respect to the fixed capital);

L_t is the residual value of the fixed capital which is retired in year t (in case of the impossibility of its use, the liquidation balance).

The set contributions to the state budget to finance social insurance benefits are taken according to a uniform standard for the entire national economy, which is equal to 40 percent of the wage.

The integral expenditures can be represented as broken down by years of the accounting period, here a specific portion of the previously made one-time expenditures is attributed to each year

$$Z_T = \sum_{t=1}^{T} Z_t\alpha_t. \quad (3)$$

The annual adjusted expenditures are determined by the formula

$$Z_t = C_t+E_nF_t, \quad (4)$$

where C_t is the total current costs in year t (including the economic evaluation of natural resources, the set contributions to the state budget to finance social insurance benefits and the renovation deductions);

F_t is the value (balance-sheet) of the productive capital in year t, which was created by means of capital investments in the given measure of scientific and technical progress.

The renovation deductions are determined by the norm of the renovation of equipment with allowance made for the time factor

$$k_r = \frac{E_n}{(1+E_n)^{t_{sl}}-1}, \tag{5}$$

where t_{sl} is the service life of the equipment.

The value of the integral economic impact in the national economy (E_T) in this case is defined as the difference of the adjusted expenditures according to the base (with the index 1) and the new (with the index 2) versions

$$E_T = \sum_{t=1}^{T} E_t \alpha_t = Z_{1t} - Z_{2t}. \tag{6}$$

In the most general case, when the effective results differ with respect to the compared versions of the measure of scientific and technical progress, for each one of them it is necessary to determine the economic evaluation of the total national economic result (R_T) from the production and use of the product (work) with respect to the given version of the measure of scientific and technical progress, and then the value of the integral national economic impact:

$$E_T = \sum_{t=1}^{T} E_t \alpha_t = R_T - Z_T. \tag{7}$$

The national economic result from a new product is determined on the basis of the consideration of the economic (as well as social and ecological) differences in its production by years of the accounting period and in the use of this product in various spheres of consumption.

For the separate sphere the national economic result reflects the impact of the user, that is, the economic advantage which the user of this sphere obtains due to the higher technical and economic (as well as social, ecological and other) parameters of the new product as compared with the product being replaced (productivity, reliability, operating economy and others).

Thus, the change of the consumer properties of the product (equipment), that is, its quality, should find full reflection in the national economic result.

The impact for the user from the saving of expenditures in case of the use of new equipment as compared with the base equipment finds reflection in the full integral impact, with is calculated with respect to the production and use of new equipment. The determination of the coefficients of equivalence of the replacement of the base equipment with new equipment with allowance made for the conditions of its operation in different spheres of consumption remains the most important problem.

Whereas the basic parameters of the machines, with respect to which the equivalence, for example, their productivity, is determined, can be distinguished as applied to the industrial use of equipment, especially in machine building, in other cases it is necessary to use the methods of qualimetry. Here the standardization of the qualitative parameters, the establishment of their standard values, scales and so on assume particular importance. Let us note that such an approach is specific for socialist production, in which competition and the market formation of prices are absent.

The wholesale prices for a new product and equipment only in exceptional cases can be equal to the national economic result (the upper limit) or the adjusted expenditures (the lower limit). Usually they are equal to some intermediate values. These values are also used for determining the amount of the cost accounting impact.

The cost accounting impact as the planned increase of the profit with respect to measures of scientific and technical progress is determined separately for the producers and the users of the new product. The planned increase of the profit (ΔP) in connection with the production of a new product instead of the product being removed from production is determined by the formula

$$\Delta P = (WP_2 - C_2)A_2 - (WP_1 - C_1)A_1, \tag{8}$$

where WP_2 and C_2 are the wholesale price (without the turnover tax, but with allowance made for the markup on the price for a new highly efficient product for production engineering purposes)[4] and the production cost of a unit of the new product, respectively, rubles;

WP_1 and C_1 are the wholesale price (without the turnover tax) and the production cost of a unit of the product being replaced, respectively, rubles;

A_1 and A_2 are the production volume of the product being replaced and the new product in physical units, respectively.

The consolidated cost accounting impact of measures of scientific and technical progress (the production and use of the new product) is defined as the annual cost accounting impact with the values established in the plan of the standards of the efficiency of economic resources, that is, as the difference between the total (with respect to production and use) increase of the profit and the standard impact of capital resources

$$E_c = \sum_{i=1}^{n} \Delta P_i - \sum_{i=1}^{n} \Delta K_i, \tag{9}$$

where E_c is the consolidated cost accounting impact from the implementatio of measures of scientific and technical progress in the given year of the planned period;

$\sum_{i=1}^{n} \Delta P_i$ is the total (with respect to the production and use of the new product) increase of the profit from all n measures of scientific and technical progress in the given year.

$\sum_{i=1}^{n} \Delta K_i$ is the capital investments (one-time expenditures) in the fixed production capital and the increase (decrease) of the physical working capital during the given year.

The total amount of the economic impact, which is obtained in the national economy from the implementation of all the measures of scientific and technical progress during the corresponding year of the planned period, is determined by the direct addition of the consolidated cost accounting impacts--with respect to enterprises, sectors and the national economy as a whole. The total amount of the consolidate cost accounting impact characterizes the overall increase of the national income due to scientific and technical progress.

The planned cost accounting indicators of the formulation and introduction of scientific and technical measures are used for the determination of the influence of new equipment on production efficiency. The obtained results are used in case of the establishment of plan assignments for enterprises and sectors on the production cost, labor productivity, the profit, the output-capital ratio, the profitability and so on. Moreover, the plan assignments on the number of workers and the saving of fuel, energy, material and raw material resources are determined on the basis of the calculations of the cost accounting impact of scientific and technical measures.

The methods of reflecting the national economic impact in cost accounting indicators, which are included in the draft of the Procedural Instructions, are not at variance with the means, which were established by the 1977 method and the Procedural Instructions of the USSR State Planning Committee of 1980, and, consequently, conform to the prevailing practice of planning and statistical accounting. However, the comprehensive nature of the improvement of the entire economic mechanism for the purpose of aligning it with the acceleration of scientific and technical progress requires the elaboration of an interconnected set of measures on the practical assurance of the increase of the efficiency of social production.

What specific practical steps in the indicated direction could be taken with the use of the elaborated methods of evaluating the effectiveness of measures of scientific and technical progress?

In our opinion, a currently missing stage--the stage of the economic substantiation of the best version of the implementation of technical policy in the sectors and the intersectorial complexes of the national economy--should be included in the general technology of the drafting of state plans. The unified Procedural Instructions on the Comprehensive Evaluation of the Effectiveness of Measures Which Are Aimed at the Acceleration of Scientific and Technical Progress should also serve this stage.

Thus, the means of calculating the integral impact for different classes of measures and levels of management, as well as the standard demands of the plan on the efficiency of the use of production resources (labor, capital investments, natural resources an so on) should be regulated by this document. By means of the Procedural Instructions the question of the permissible price level should be settled and the limit of the maximum expenditures on the designing and production of new equipment should be determined.

Moreover, it is necessary to ensure in the plan the transition to a set of effective units. The limit of the maximum expenditures on the production of new equipment is taken as the reference base for the measurement of the plan in effective units. Its amount is determined in conformity with the saving which the user of the new equipment obtains during the entire period of its productive use. The calculation of the saving should also be made in accordance with the Procedural Instructions.

One should reject the planning of individual stages of the operations, which are connected with the development, production and use of new equipment, and change over to the system of continuous comprehensive planning with an orientation toward the ultimate indicators of the meeting of the needs and the efficiency of this equipment for the user. In this connection the assignments of the plan should be issued as plan-orders and should be officially registered by economic contracts for the entire period of the elaboration, development and mass production of new equipment. It is necessary to specify the annual plans according to the amount of the issued plan-orders, the period of the fulfillment of which ends during the given year. It is proposed to reject the approval and reapproval of the limits of capital investments and the incentive for the annual results of the work, without regard for the entire cycle of the elaboration, development and use of new equipment. Here the recording of the fulfillment of the plan should be carried out by a cumulative total for the entire planned period of the output of the new equipment.

The currently possible extremely small amount of the payments for production resources does not reflect the national economic degree of the efficiency of their use.

The fact that the fee for productive capital is withheld from its initial (balance-sheet) value, which does not take into account the physical wear and obsolescence of equipment and, thus, the changes of the production potential of associations and enterprises, also introduces a significant distortion in the evaluation of the overall production efficiency. This means that the fee for capital cannot effectively fulfill its equalizing function (frequently the enterprises, the real production potential of which is less than that of others which pay the fee in a smaller amount, should pay a large fee). Under these conditions numerous petitions on the abolition of the fee for capital, the satisfaction of which entails the decrease of the effectiveness of this important economic lever, are becoming inevitable.

The low bank interest rate for long-term credit as compared with the standard of the effectiveness of capital investments, the lack in prevailing cost accounting of the consideration of the time factor, a developed system of compensatory payments and so on are also of considerable importance in the distortion of the real contribution of enterprises to the increase of the overall production efficiency.

In case of the calculation of the profit, especially in the raw material sectors, the rent payments are still being taken extremely poorly into account, which is leading to distortions in its level and dynamics and to the separation of its amount from the economic impact in the national economy (the

national economic net profit). A profit can be derived in the former or even in a larger amount in case of the retention of the output of old, obsolete products. Moreover, new production always involves risk, a decrease of the pace and the loss of moral prestige. The prices, which do not reflect the real efficiency of new equipment for the national economy and do not take into account to what extent the new product meets the demands of the consumer, appear as the main reason here.

For the solution of this problem, in our opinion, it is necessary to conduct an economic experiment on the new conditions of the implementation of a number of types of new equipment (NC machine tools, flexible automated systems, electronic computer technology and so forth).

It would be important to pursue a more flexible policy of the establishment of the prices for fundamentally new equipment. During the first period of assimilation, when the expenditures on its production are especially high, it may prove to be advisable for individual types of new equipment to establish two prices: a lower price for the user and a higher price for the producer. Upon completion of the assimilation a unified price, which is established at the level of the price of the user, should be introduced. In this case the mechanism of graduated prices, which decrease in time and reflect the real dynamics of the decrease of the expenditures on the production of new equipment, will be in effect in the sphere of production. The levels of the prices, just as the constant prices for the user, should be approved at the same time as the approval of the technical assignment and the plan of production of the new equipment.

The mechanism of graduated prices should also be retained for the period of adjusted series production, which will exert powerful pressure on the producer by the need for the constant improvement of production and the product which he produces. It is important for the dynamics of the prices to be reported in good time to associations and enterprises (as a rule, prior to the approval of the production plan). The use of contract prices, which are established on the basis of graduated list prices, is also possible.

Thus, it seems to us that it is necessary to use as pressing steps in the direction of the intensification of the national economy the previously presented recommendations on the comprehensive evaluation of the effectiveness of measures, which are aimed at the acceleration of scientific and technical progress, and on the provision of the cost accounting conditions of the implementation of scientific and technical achievements in production.

FOOTNOTES

1. Hereinafter for brevity the Procedural Instructions.

2. Hereinafter for brevity the 1977 method.

3. Hereinafter for brevity the Comprehensive Method.

4. In conformity with "Metodika opredeleniya optovykh tsen i normativov chistoy produktsii na novyye mashiny, oborudovaniye i pribory proizvodstvenno-tekhnicheskogo naznacheniya" [The Method of Determining the Wholesale Prices and Standards of the Net Output for New Machines, Equipment and Instruments for Production Engineering Purposes], Moscow, Goskomtsen, 1982.

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ORGANIZATION, PLANNING AND COORDINATION

ESTONIAN PARTICIPATION IN NATIONAL SCIENTIFIC PROGRAMS

Tallinn KOMMUNIST ESTONII in Russian No 4, Apr 85 pp 37-40

[Article by Vice President of the Estonian SSR Academy of Sciences A. Keyerna and Deputy Chief Scientific Secretary of the Estonian SSR Academy of Sciences G. Varlamova: "The Contribution to the Unified Scientific Potential of the Country"; passages rendered in all capital letters printed in boldface in source]

[Text] The task posed by the party--to change the economy of the country over to the path of primarily intensive development--presumes the implementation on the scale of the state of a unified scientific and technical policy and on this basis the acceleration of scientific and technical progress. The objective necessity of such acceleration was prepared by all the previous development of the USSR economy and conforms to the laws of economic growth during the period of mature socialism. Therefore, at the 26th party congress and the subsequent CPSU Central Committee plenums much attention was devoted to the development of science and technology and to the urgent tasks in this area. These tasks were given concrete expression in the decree of the CPSU Central Committee and the USSR Council of Ministers "On Measures on the Acceleration of Scientific and Technical Progress in the National Economy."

"The efforts of the party are aimed first of all at the completion of the intensification of the economy of the country on the basis of the significant acceleration of scientific and technical progress, the all-round refinement and improvement of the forms and methods of socialist management. Only in this way can the most advanced scientific and technical base, which conforms to the strict standards of mature socialism, be created and, thus, can a qualitatively new level of the well-being of the Soviet people be ensured," K. U. Chernenko stressed in the article "To the Level of the Requirements of Mature Socialism."

In order in the next few years to substantially increase labor productivity in all the sectors of the national economy and to ensure the output of machines, equipment and materials at the level of the best world examples, it is necessary on the basis of fundamentally new equipment and technology to carry out the retooling of production and to increase the level and effectiveness of scientific research and experimental design work.

The orientation of science toward the solution of the most important scientific, technical and socioeconomic problems of the improvement of mature socialism requires the further improvement of the system of the management, organization and planning of science itself. Today the goal program method of the planning of science and technology conforms to the greatest extent to these goals. During the 11th Five-Year Plan 170 all-union scientific and technical programs have been formulated and are being implemented for the comprehensive solution of the most urgent problems of the development of the USSR national economy. The Estonian SSR Academy of Sciences and other scientific organizations of the republic, which are a component of the unified all-union scientific potential, are also taking part in this important work. Thus, the institutions of the Estonian SSR Academy of Sciences are taking part in the implementation of 18 all-union scientific and technical programs, including 9 comprehensive goal programs. About 25 percent of all the allocations for scientific research and experimental design work are being channeled annually into the performance of the corresponding research. In their activity our institutes of physics, cybernetics, chemical and biological physics and chemistry are associated more than others with the implementation of the all-union programs.

Life confirms that the participation of republic scientific institutions in the formulation of all-union programs is contributing at the same time to the broadening and intensification of the research of local problems. Owing precisely to cooperation with all-union institutes and scientific institutions of the fraternal republics the scientists of Soviet Estonia have achieved appreciable gains in biotechnology, laser equipment and technology, the complete use of natural resources and other promising directions, which are of decisive importance for the acceleration of scientific and technical progress.

The Institute of Economics of the Estonian SSR Academy of Sciences is taking past in drawing up THE ALL-UNION COMPREHENSIVE PROGRAM OF SCIENTIFIC AND TECHNICAL PROGRESS, of which the program of the development of science and technology in our republic is one of the parts. The program of scientific and technical development for 1986-2005, which was approved by the Estonian CP Central Committee and the Estonian SSR Council of Ministers, became the first part of this vast work. At present--at the second stage of the work--the preparation for drawing up a regional program to 2010 is under way and at the same time a search for the solution of key problems of the economy, which were not solved at the first stage, is being conducted.

Four institutes of the Estonian SSR Academy of Sciences are engaged IN THE PROGRAM OF THE ASSIMILATION AND COMPLETE PROCESSING OF NONPETROLEUM TYPES OF FUEL (IN THE ESTONIAN SSR SHALE--THE MOST PREVALENT MINERAL HERE). The possibilities of increasing the efficiency and expanding the power engineering use of oil shales at various deposits are being studied at the Institute of Thermal Physics and Electrophysics. One of the goals of this work is to determine in the future the role of shales in the fuel and power balance of the Northwest of the USSR. As a result of this research the optimum amounts of the mining and consumption of power shale were determined, the versions of the increase of the production of liquid fuel from local oil shales, as well as the possibilities of the more extensive use of shale ash in agriculture and construction were examined. As a result of the scientific research work on

the shales of the Volga River area their physical chemical properties were studied, a pilot plant for the study of the two-stage combustion of these shales with their gasification in the fluidized bed was produced.

At the Institute of Chemistry within the named program scientific research work is being performed for the purpose of issuing recommendations on the industrial introduction of the process of the low temperature liquefaction of the organic matter of oil shales (including low calorie shales) in the presence of superheated solvents.

At the Institute of Geology the main shale deposits in the West of the USSR are being studied and the optimum directions of the use of oil shales are being formulated. At present a universal diagram for the classification of kukersites and kerogen-containing rocks of the commercial member of the Baltic shale basin, which is making it possible to estimate approximately the ash content and the composition of the ash in case of the combustion of shale, as well as to predict the technological features of various types of shales, which are used as fuel or a raw material for the chemical industry, has been developed.

The task of the Institute of Economics is to determine the prospects of the development of the shale industry and to give it an economic evaluation. For these purposes the influence of the quality of the shale being mined on the change of the profitability and other indicators of shale mining, the shale chemical industry and shale power engineering has been analyzed and a comparison of the prevailing scale of prices for shale with the expenditures on its mining and concentration has also been made. Such calculations are making it possible to evaluate the economic advisability of the mining and processing of shales of different quality. Such an evaluation is necessary for the further planning of the development of this sector of industry with allowance made for the need to use natural resources efficiently.

THE COMPREHENSIVE GOAL PROGRAM OF THE AUTOMATION OF SCIENTIFIC RESEARCH is called upon to expedite scientific research work and to increase its efficiency mainly by the use of electronic computer technology. Four of our institutes have also been enlisted in the formulation of this program. At the Institute of Physics a system of the automated gathering and processing of data on an X-ray spectrometer and a base operating system of the automation of spectroscopic experiments in a unified multicomputer complex on the basis of computers have been developed. At the Institute of Chemical and Biological Physics a system of the automation of experiments on the study of photochemical reactions which are generated by laser radiation has been developed and assimilated. Control by means of computers is being used extensively for the acceleration of research at the Institute of Astrophysics and Atmospheric Physics. The Institute of Cybernetics jointly with the Special Design Bureau of Computer Technology is developing supporting equipment (fundamental circuit arrangements, printed circuit boards) for an automated system of the gathering and processing of data which are obtained during physics experiments. The institute has turned over to one of the pilot plants of the USSR Academy of Sciences the working documents, on the basis of which the plant has assimilated the small-series production of high precision analog-to-digital converters. The technical specifications for instruments,

which have been developed by scientists and engineers of the institute and special design bureau, are also being turned over to other plants of scientific equipment, which are located outside the republic.

The Institute of Cybernetics and its special design bureau have achieved significant results in THE DEVELOPMENT AND ASSIMILATION OF PROMISING MEANS OF COMPUTER TECHNOLOGY AND AUTOMATED CONTROL SYSTEMS. The work being performed in accordance with this program is aimed at the increase of production efficiency and the decrease of the need for manpower in many sectors of the national economy.

The institutes of the Estonian SSR Academy of Sciences are solving very important problems within the all-union comprehensive goal program "MEANS OF THE CHEMICAL PROTECTION OF PLANTS AND ANIMALS." The Institute of Chemistry jointly with the pilot plant of organic synthesis and biological preparations and the Institute of Zoology and Botany are participating in the implementation of two subprograms, the goal of which is the development of new effective chemical means of protecting plants (pesticides), which are safe for man and the biosphere, the development and assimilation of the technological processes of their production, as well as the search for effective processes of the control [word(s) illegible] of the most important harmful types of agrocenosis under the conditions of intensive plant growing.

At present original pheromone preparations, which have a low phytotoxicity and have been tested against hothouse pests in Estonia and Moldavia, have already been developed. The chemical composition of the sexual pheromones of click beetles has been determined and methods of synthesizing the active substances of these pheromones have been developed. Preliminary tests under field conditions showed the satisfactory biological activity (that is, the ability to attract male pests) of the synthesized preparations. Pilot plants, on which pheromone attractants for click beetles, as well as industrial pheromones for combating these pests, have been put into operation at the above-named plant. The small-series production of pheromone traps of an original design, which are used for determining the population of steppe and seed click beetles, has been assimilated. In 17 oblasts of the RSFSR and the Ukraine production tests have been conducted with the use of the pheromone means developed in our republic for the establishment of the infestation of the soil with click beetle larvae.

One figure is sufficient to characterize the economic impact of this work: the extensive use of pheromone means, which suppress the propagation just of steppe and seed click beetles, will make it possible to save for the USSR national economy about 90 million rubles a year.

THE COMPREHENSIVE GOAL PROGRAM "THE WORLD OCEAN," in the fulfillment of which the Institute of Thermal Physics and Electrophysics and the Institute of Zoology and Botany are participating, and the former of them is one of the leading scientific institutions for the international project of the study of the Baltic Sea, is of great international importance. Thus, the factors, which influence the density structure and currents in the deep layers of the Baltic, were identified during the expeditions of the research vessels "Ayu Dag" and "Arnold Veymer." The maculose structures of the water bodies,

plankton and concentration of chemical compounds in the sea were established and the dependence of these structures on large-scale physical and chemical biological processes was studied. On the basis of this and other research a system of the monitoring of the marine environment (that is, a system of the constant checking of this environment) was developed and proposed for international introduction.

The task of the scientists of the Institute of Zoology and Botany is the qualitative and quantitative description of communities of the zoobenthos (the group of animals which live at the bottom of sea and fresh-water reservoirs). Descriptions of the zoobenthos for individual large zones of the Baltic Sea have already been compiled, which [words illegible] the biomass, the population density and the specific diversity of individual benthoses, as well as the most important natural and anthropogenic (caused by the activity of man) ecological factors.

At the same time the institutes of the Estonian SSR Academy of Sciences are taking part in the implementation of THE ALL-UNION COMPREHENSIVE GOAL PROGRAMS ON LASER EQUIPMENT, AUTOMATIC MANIPULATORS, MOLECULAR BIOLOGY, SPACE RESEARCH, EARTHQUAKE PREDICTION and a large number of other problems. For the research being conducted in accordance with all these programs the engineers and technicians of our design bureaus have developed quite a number of original experimental and measuring instruments and systems, which are being used successfully both here and at all-union scientific institutions.

The participation of the scientific institutions of our republic in the solution of the most important problems of the entire national economy attests to the increase of the contribution of scientists of the Estonian SSR to the scientific potential of the Soviet Union. The increase of the level of the research being conducted in the republic is confirmed by the fact that in 1984 among the most important scientific results, which were noted by the USSR Academy of Sciences, 62 were achieved in our republic (of them 50 were in the system of the Estonian SSR Academy of Sciences).

Joint scientific publications, which have drawn attention not only in our country, but also abroad, are being published in cooperation with large scientific centers and leading scientists of the country. In 1984 the joint work of geologists of Estonia, Latvia, Lithuania and Moscow "The Comprehensive Geological Study of the Territory of the Baltic Region of the USSR and the Compilation of Consolidated Geological Maps on a 1:500,000 Scale" was awarded the USSR State Prize in Science and Technology. This work is of great theoretical and practical importance, moreover, the fact that all the problems connected with geology are examined in it in combination, is especially valuable. The maps of minerals, hydrogeological and other maps, which were compiled on the basis of many years of research, show the distribution of natural resources on the territory of the entire region and give an idea of their reserves, quality and interconnection. It is necessary to know this in order to use natural resources efficiently and, moreover, to spare the environment in every possible way.

The works of scientists of the Institute of Astrophysics and Atmospheric Physics on the study of luminescent clouds, which was conducted jointly with

the cosmonauts who works on board the Salyut-6 and Salyut-7 orbital stations, have received universal recognition.

Such intensive cooperation, while contributing to the increase of the theoretical level of the research being conducted in the republic and speeding up the development of scientific thought, at the same time is also helping to solve better our specific regional problems. For example, the joint work of the Institute of Chemistry of the Estonian SSR Academy of Sciences and the Power Engineering Institute imeni G. M. Krzhizhanovskiy is making it possible to solve successfully the problems of the complete use of shales. Scientists of the Institute of Experimental Biology of the Estonian SSR Academy of Sciences jointly with colleagues from the Institute of Molecular Biology of the Ukrainian SSR Academy of Sciences, the Siberian Scientific Research Institute of Plant Growing and Selection and scientific institutions of other fraternal republics achieved good results in the testing of mutants of soft wheat and so on.

At the same time all-union scientific organizations are directly participating in the elaboration of a number of technical and technological problems on the orders of industrial associations and large enterprises of our republic, the managers and specialists of which, incidentally, appreciate the assistance being given to them. The expedience of such a division of labor is obvious: science of the Estonian SSR, just as its economy, is a fundamental part of the unified all-union scientific and economic organism. Thus, the economy of any union republic by no means should be entirely oriented only toward the local scientific potential, for this leads to the duplication of research and makes it incumbent, figuratively speaking, to invent the bicycle. The purposeful coordination of the activity of republic and all-union institutions of science and the division of labor among them create the best opportunities for the economical and effective solution of both regional and all-union problems.

Along with this it should be borne in mind that the scientific potential of our republic is being used far from completely. At the 28th Estonian CP Congress, which outlined the basic directions of the development of the national economy of the republic for the current five-year plan, the need to strengthen the contacts of science with production and to expedite the introduction of scientific achievements in production, to shorten the time of the assimilation of new equipment and technology was stressed. These instructions are being implemented, but, as was noted at the republic meeting of the party and economic aktiv, which was held last year and discussed steps on the acceleration of scientific and technical progress in the national economy of the Estonian SSR, the role of scientists in the solution of the urgent and pressing problems arising in the sectors of the economy is still insufficient. The increase of the role of science in the national economy of the republic presumes, on the one hand, the need to use more efficiently the assets being earmarked for scientific work, to increase the effectiveness of research and experimental design work and to concentrate scientific forces on the solution of the national economic problems, which are especially important for us, and, on the other, the need to use the results of scientific work more actively in the national economy, including by the increase of the share of science-intensive products in our industry.

In the search for the most advisable means of realizing the reserves and potentials of scientific institutions the republic Academy of Sciences recently conducted a survey of managers and specialists of large industrial enterprises in order to ascertain what specific assistance they expect from scientists for the acceleration of the development of production. On the basis of the obtained data a list of the scientific and technical problems, on the solution of which it is necessary in the future to concentrate the efforts of scientists, is being drawn up, and measures on the assurance of the closer integration of the scientific and technical potential of the republic are also being elaborated. The latter is necessary for the assurance of the increase of production efficiency, which is envisaged by the plan of the economic and social development of the Estonian SSR.

At present it is still impossible to speak about the final results of this work, but the initial analysis of the responses received during the survey shows that experienced workers often do not know to whom to turn for an answer to one specific question or another, moreover, many do not have even an idea of what assistance science can already now give to this sector of production and on what it is possible to count in the immediate future. The fact that a portion of the problems, the solution of which they are waiting for at the works, to a greater or smaller extent have already been studied by science, but the corresponding information is not available at enterprises, also sets one thinking. This once again points out the need to improve and increase the interrelations of science and production, to develop and strengthen the cooperation between scientific and production collectives.

At the All-Union Applied Science Conference "The Improvement of Mature Socialism and the Ideological Work of the Party in Light of the Decisions of the June (1983) CPSU Central Committee Plenum," which was held at the end of last year, it was emphasized that only an intensive economy, which develops on the latest scientific and technical basis, can serve as a firm material base of the increase of the well-being of the working people and ensure the strengthening of our positions on the international arena. Hence follows a task of great political importance: to speed up significantly the development of science and technology, in order to raise the national economy to a qualitatively new scientific, technical, organizational and economic level and to achieve a decisive change in the intensification and the increase of the efficiency of social production.

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ORGANIZATION, PLANNING AND COORDINATION

RESEARCH, DEVELOPMENT AT RSFSR HIGHER EDUCATIONAL INSTITUTIONS

Moscow IZVESTIYA in Russian 28 Jun 85 p 2

[Interview with RSFSR Minister of Higher and Secondary Specialized Education Academician Ivan Filippovich Obraztsov by B. Konovalov: "Remove the Barriers"]

[Text] An exhibition of the scientific and technical achievements of higher educational institutions of the RSFSR was held these days in the building of the House of Soviets of the RSFSR. This is an impressive display of works which were performed at a high level. About 500 developments were presented at the exhibition. The economic impact from their introduction comes to about 150 million rubles.

The potential of science of the higher educational institution is enormous. It is possible to judge this from the example of the RSFSR Ministry of Higher and Secondary Specialized Education. Here 130,000 people are engaged in scientific research. This is more than at the union and all the republic academies of sciences. The total amount of scientific research work, which was performed in the RSFSR Ministry of Higher and Secondary Specialized Education in 1984, in monetary terms came to 680 million rubles.

At the same time at the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress it was emphasized that "higher educational institutions can increase the amount of scientific research work by 2- to 2.5-fold." This interview is devoted to the barriers which are interfering with the use of the mighty potential of science of the higher educational institution.

[Question] Ivan Filippovich, the main resource of higher educational institutions is skilled personnel. At the same time, when you go to higher educational institutions and familiarize yourself in detail with the research work, you see: frequently we, as they say, shoot at sparrows from a cannon. The total amounts of the contracts at all of them are impressive, but if you

look closely at what they are composed of, it turns out that most often these are minor jobs.

[Answer] You are right. Work on minor themes is a dangerous trend. And we are waging a campaign against it. During this five-year plan a cost accounting scientific association of the RSFSR Ministry of Higher and Secondary Specialized Education, to which 87 higher educational institutions belong, is operating here. They account for 80 percent of the total amount of scientific research and experimental design work. The basic principle of the activity of the association is the goal program method of concentrating efforts on the solution of major scientific and technical problems which are important for the national economy. The association is taking part in 134 all-union programs, which are often intersectorial in their nature. The RSFSR Ministry of Higher and Secondary Specialized Education is playing the lead role in 15 such programs.

Thus, for example, Novocherkassk Polytechnical Institute is the main organization in the development of automated systems of the comprehensive training of operators, to put it more simply simulators for the most different sectors of the national economy. In all 50 enterprises, scientific research institutes and design bureaus of 18 sectors and departments are taking part in the implementation of this major program. The main goal is to form the industrial technology of devising simulators on the basis of standardized modules. This will make it possible with an enormous saving of time and resources to devise simulators for cosmonauts, airplane pilots, operators of electric power plants and production controllers of large industrial enterprises. Simulators for such "exotic" occupations as a cosmonaut and such "prosaic" ones as an operator of a portal crane were displayed at the exhibition. They are equally important for the country.

The Nonchernozem Zone Comprehensive Scientific and Technical Program united 6,000 performers from 38 higher educational institutions of the RSFSR. At the same time as this the tendency toward the uniting of different chairs of one higher educational institution for the accomplishment of a major program or some integral new technology is gathering strength. Thus, the Moscow Technological Institute of the Meat and Dairy Industry concentrated the efforts of its chairs on the development of a waste-free technology of the use of animal protein when producing sausages. The annual impact of this work is now already equivalent to the raising of a herd of 35,000 bull calves. But given the more complete use of the technology this "herd" will be far more impressive.

Many goal programs are now being fulfilled by the forces of the temporary collectives of higher educational institutions and sectorial enterprises, which are set up by joint orders of two ministries. This also increases the effectiveness of the efforts which are aimed simultaneously at the development of models of new equipment and technology at the specified time. As a whole we are now striving to shift from the level of "chair-enterprise" and "higher educational institution-main administration" contracts, which is hard to control, to the level of "ministry-ministry" programs. And now such comprehensive goal programs already account for approximately 30 percent of the total amount of research work.

[Question] But a large portion is still at the mercy of the elements, and for the most part such work is organized on the basis of the principle "I do what I can and want to," and not on the basis of the problems which are actually urgent and important for the country.

[Answer] Yes, for the present it is too early for us to be satisfied. But our efforts alone are too little to bring this reserve, expressing ourselves in military language, into the axis of the main thrust. It is necessary to solve a large number of problems and, what is the main thing, to change the very attitude toward science of the higher educational institution and to cease to regard it as a secondary force. Important state problems must be posed for us and the possibilities of their solution must be ensured in a state manner.

At present enterprises are readily concluding contracts with higher educational institutions. But in essence they do not report back on the spent money. They simply report to the ministry that the money was used for economic contractual operations. If a development is promising, the sector carries it out further on its own. Higher educational institutions do not yet have any revenue from this. While our pilot experimental organizations are too weak to independently bring a development up to series production.

As paradoxical as this is, higher educational institutions are not included in the sector "Science and Scientific Service." Such an item of expenditures as "science" is not planned for higher educational institutions. We are going through only the sector "public education." And we are being properly supplied. For example, 10-15 percent of our orders for scientific equipment are being filled, while its updating comes to only 1.5-2 percent a year.

The USSR State Committee for Science and Technology and the USSR State Planning Committee plan for us for scientific research only the wage fund and the number. All the physical assets and resources for the solution of scientific and technical problems are allocated by the sectors.

According to the idea, they should share these resources with us. But it does not actually turn out that way. A contract, for example, is worth 50,000 rubles, while the computer, which is necessary for its fulfillment, is 10-fold more expensive. Of course, it cannot be said that we do not get anything. It is possible to cite examples of when ministries help to develop the experimental base of higher educational institutions. Thus, an engineering laboratory building is being built for the Tantal Special Design and Technological Bureau of the Ufa Aviation Institute. But as a whole, if we speak frankly, the sectors are inadequately allocating to us resource supply.

[Question] But it is difficult to develop an identically strong base for experimental design operations in sectors, at the academy and in the Ministry of Higher and Secondary Specialized Education. Apparently, it is necessary to seek some interdepartmental solutions.

[Answer] First of all there should be the purposeful redistribution of resources. It is hardly wise to invest assets in the development of the

experimental and experimental design base of tens of sectorial institutes, at which there is only 1 candidate of sciences per 1,500 people (but there are plenty of such examples). And at the same time in the RSFSR Ministry of Higher and Secondary Specialized Education there are 44,000 doctors and candidates of sciences, whose creative potentials we cannot fully utilize. It is time to allocate money and resources not simply for the maintenance of institutes, but for specific scientific and technical programs with set goals.

Of course, it is advantageous to set up general regional bases for the implementation of scientific ideas. We ourselves are trying to take the path of specialization and cooperation. At present 4 experimental centers made up of 100 planned joint complexes of higher educational institutions are already in operation. The idea is that each higher educational institution would do what it knows best how to do for all of them on the basis of cost accounting. And single-design equipment would be used in the same way. Thus, we are deliberately forming an effective structure of the scientific service of regions. At present the amount of joint services of higher educational institutions has already reached 5 million rubles. By the end of this year it will come to 10 million rubles. It makes good sense to convert these complexes from joint complexes of higher educational institutions into interdepartmental complexes which include academic and sectorial institutions. But state decisions and the strengthening of the cost accounting principle in the life of all scientific institutions are necessary for this.

The RSFSR is the largest republic. And on the basis of its example one can see well how the allocation of the "lion's share" of resources to all-union sectors leads to the neglect of republic tasks. Unfortunately, we are conducting a very small portion of the scientific research directly in the interests of the republic. Given the existing procedure of financing the republic ministries should act only through the union ministries. Therefore, they cannot in practice act as clients for the solution of important and topical republic problems.

This applies to an even greater extent to regional problems. The Ministry of Higher and Secondary Specialized Education by its very nature is an interdepartmental organization and literally was specially set up to solve regional scientific and technical problems. But there are no clients, especially for the humanities. But do we really, for example, not need serious sociological studies of the problems of regions? It would be advisable to allocate a portion of the assets to the organs of soviet power of krays and oblasts for ordering the scientific research which the regions urgently need.

[Question] How has the establishment of the cost accounting association in the RSFSR Ministry of Higher and Secondary Specialized Education affected the material status of scientists?

[Answer] As a whole scientific research is providing an additional increment to the wage of scientists of higher educational institutions--up to 50 percent. There is now money for investments in sociocultural and consumer service facilities. But they are not provided with enough assets and materials. And this situation must be changed. Higher educational

institutions should have the opportunity to "back with goods" the earned money.

[Question] Has the introduction of scientific developments quickened?

[Answer] As a whole, yes. But the situation remains difficult. Of the 144 developments of the RSFSR Ministry of Higher and Secondary Specialized Education, which were submitted in 1983 to the RSFSR State Planning Committee and the State Committee for Science and Technology, only 80 were recommended for introduction, while in 1984 of 204 only 46 were. Moreover, unfortunately, most often the introduction of developments takes place singularly, and not on a broad scale. Several effective developments have not been used extensively for decades. For example, long ago the idea of swirling-type furnaces for heat and electric power plants originated at Leningrad Polytechnical Institute. Here the dimensions of the furnaces are reduced to one-half, their efficiency increases by 4 percent, the possibility of the efficient combustion of low-grade fuel without any fuel oil additives appears. Moreover, the harmful emissions are reduced by 20 percent. So what? A new boiler with a swirling-type furnace was installed only at the Ust-Ilimskaya Heat and Electric Power Plant. At 30 plants they converted the furnace. But thousands of heat and electric power stations and GRES's of the country are not using this economical furnace, old ones are being installed at new plants. Neither the Ministry of Power and Electrification nor the Ministry of Power Machine Building has organized the extensive copying of the development.

Representatives of state and planning organs and union and republic ministers visited the exhibition of the RSFSR Ministry of Higher and Secondary Specialized Education. I believe that this will have a positive effect on the acceleration of the extensive introduction of the displayed developments.

But the finest design development will remain only a development or a single instrument, machine and technology, if as before there is nowhere to organize industrial production. The decree of the CPSU Central Committee and the USSR Council of Ministers "On Measures on the Acceleration of Scientific and Technical Progress in the National Economy" envisaged the establishment of reserve capacities at enterprises for the output of new products. It must be said that the ministries have not done this--all the capacities have been completely load for the fulfillment of the current production plans.

[Question] How does the solution of scientific problems affect the basic task of higher educational institutions--the training of personnel?

[Answer] In the process of setting up our cost accounting association the union of the educational and scientific process was strengthening substantially. And this, perhaps, is the most important thing. Young people are trained best of all by solving real practical problems. But there are not enough budgetary assets which are released for the training of specialists of many modern occupations, because the educational process has become science-intensive and more expensive. The "supplementary payment" can come through the assets which are earned by scientists of higher educational institutions. We are confident that if scientific research work at higher educational institutions is properly organized with the extensive use of cost accounting

methods, the Ministry of Higher and Secondary Specialized Education can live differently than today. In my opinion, an entirely practicable task in the future is to change many higher educational institutions over to self-sufficiency. Both science and education will gain from this.

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ORGANIZATION, PLANNING AND COORDINATION

IMPROVED SYSTEM OF BONUSES FOR NEW EQUIPMENT URGED

Moscow SOTSIALISTICHESKIY TRUD in Russian No 4, Apr 85 pp 57-64

[Article by Candidate of Economic Sciences V. Rakoti: "Increase the Stimulating Role of Bonuses for New Equipment"]

[Text] In light of the solution of the problems, which are connected with the intensification of the economy, it is necessary to increase the interest of workers of the most diverse categories of enterprises and organizations and the sectors of the national economy in the generation of scientific and technical developments at the world level or a level which exceeds it and in their quickest introduction in production.

The special system of the material stimulation of workers serves as an important means of accelerating scientific and technical progress. This system is a set of more than 20 separate statutes on various bonuses. One type of bonuses--for the development and introduction of new equipment--the payment of which is made for the fulfillment of individual jobs (themes) and the quarterly plans of operations in conformity with the statutes, which were approved by the USSR State Committee for Labor and Social problems and the All-Union Central Council of Trade Unions on 26 December 1964 and 30 January 1978, stands out among them with respect to the sphere of dissemination, the number of workers being stimulated and the amount of the sums being paid.

On the basis of the demands presently being made on the stimulation of scientific and technical progress it can be said that several conditions from the Statute on the Payment of Bonuses, which was approved more than 20 years ago (in 1964), have obviously become obsolete. The procedure of forming the funds for the payment of bonuses is meant first of all. They are created in advanced, before the start of the year. Their amounts are specified as a percent of the wage fund, while the expenditures on the formation of the funds are attributed to the product cost. Thus, the funds for the payment of bonuses do not have any connection with the actual impact from the introduction of new equipment.

The one-time bonuses for the performance of specific operations on the development and introduction of new equipment are paid from the indicated funds. The sizes of the bonuses are determined subject to the obtained

economic impact according to a regressive scale: with the increase of its absolute amount the relative size of the bonus (per ruble of impact) decreases. Here the impact is taken to be conditional, in accordance with the plan of the second year of the introduction of the developed equipment. Here there is also no connection of the incentive with the end result. Moreover, the authors of major scientific and technical developments, the fulfillment and implementation of which require a long time and the uniting of the efforts of different organizations, are in a less advantageous position with respect to the size of the bonus as compared with those who are engaged in minor operations on new equipment.

Prior to the completion of the work on the introduction of new equipment up to 70 percent of the total amount of the bonus can be paid to workers for the fulfillment of its individual stages. If workers of different ministries participated in the development and introduction of the new equipment, it is not permitted to transfer incentive assets from one sector to another (the bonuses are paid from the fund of each sector). This also hinders the uniting of the efforts of workers of different ministries in the quickest achievement of the optimum end result.

The noted shortcomings did not now become obvious. In order to eliminate them, back in 1968 a cost accounting system of the stimulation of the acceleration of scientific and technical progress, which was gradually improved, was introduced as an experiment in the electrical equipment industry. The goal of the system is to increase the dependence of the material incentive on the actual economic impact, which is obtained in connection with the introduction of new equipment. The reform concerned first of all the sources of the payment of bonuses. The additional profit from the decrease of the product cost as a result of the introduction of new equipment and a portion of the markups on the price for new highly efficient products and items with the Emblem of Quality were envisaged as the basic sources. The sizes of the bonuses began to be determined in direct proportion to the amount of the obtained economic impact. The estimated cost of operations as a source of stimulation was retained primarily for developments, the results of the use of which are not expressed as an economic impact.

In connection with the establishment of the dependence of bonuses on the actual impact, when the bonus amounts are placed at the disposal of enterprises for already introduced measures, many former conditions of their payment were abolished. Moreover, by means of the assets, which have been credited from the markups on the price for new highly efficient products, it is permitted to pay bonuses to all the participants in scientific and technical development regardless of departmental affiliation. In case of a duration of the work on the development and introduction of new equipment of not less than 2 year it is permitted to spend only up to 30 percent of the final amount of the bonus for the payment of bonuses as an advance for the fulfillment of individual stages of the work. At the same time the possibility of giving incentives to such a category as the people who actively contribute was noted so that bonuses would be paid only to those who take a direct part.

The cost accounting system of stimulation proved to be more effective as compared with the system approved in 1964. All industrial ministries, as well as the Ministry of the Maritime Fleet were converted to its conditions as they became ready. The changeover to this system of a number of other sectors of the national economy is envisaged in 1985-1987.

The check of the practice of using the established procedure of paying bonuses revealed numerous violations and failures to observe it. In conformity with the statute the bonus due should be paid, as a rule, within a month after the completion of the work. At the Volkhov Plant of Reinforced Concrete Items several bonuses were paid 5-6 months later, at the Vidnoye Passenger Motor Transport Enterprise--13 months later, and on the Moscow Railroad--2 years later. The lengthy delay of the payment of bonuses decreases their stimulating role. The practice of paying bonuses only once or twice a year regardless of the time of the completion of the work developed at several enterprises (the Tula Coal Production Association, the Estonslanets Production Association, the Kharkov Konditsioner Plant and others).

According to the Model Statute, which was approved in 1978 for the sectors which had been converted to the cost accounting system of stimulation, only the immediate participants in the development and introduction of new equipment are given incentives. Meanwhile the payment of bonuses for contributing, as the check showed, is continuing at the Kotlas Pulp and Paper Combine, the Shatura Furniture Combine and other enterprises. For example, at the Moscow Stankoagregat Plant those who actively contribute made up 25 percent of the total number of workers who are paid bonuses.

The main thing is that workers, who do not directly deal with new equipment: the chief and the secretary of the secretariat of the director of the enterprise, the chiefs of the legal division and the personnel division, accountants, timekeepers, drivers, warehouse workers, chiefs of security, communal housing departments and administrative and operating departments, directors of hotels, chiefs of kindergartens and typists, continue to be given incentives for new equipment. The unjustified broadening of the group of workers being paid bonuses leads to the decrease of the bonuses of those who really deserve them.

Another version of the violations: the payment of bonuses without regard for the personal contribution, is frequently encountered. Moreover, at times a legalized form is given to this. In the statutes of several enterprises it is stipulated that 10 percent of the amount of the bonuses is allocated for the payment of bonuses for managerial personnel regardless of their personal contribution: managerial personnel in places are paid bonuses for the fulfillment of the plan on new equipment instead of stimulation for a specific job, while the sizes of the bonuses are established, as a rule, in proportion to the amount of the salary. The general director of the Krasnyy vyborzhets Production Association arbitrarily limited the size of the bonus for workers of the enterprise to 2.5 salaries a year. All this is not conducive to the increase of the interest in the development and introduction of new equipment.

During the check other violations were also found. Thus, only the director of the enterprise has the right to approve the bonuses for workers of shops and

sections, but at the Podolsk Machine Building Plant imeni Kalinin they are approved by the chiefs of the shops. According to the statute, which was adopted in 1964, the amounts of the one-time bonuses are determined according to a scale which stipulates their very minimum sizes, but at the Volkhov Plant of Reinforced Concrete Items the bonuses are established at less than this minimum. Enterprises should not allocate a portion of the bonus amount to superior organizations, since their workers are not paid bonuses for new equipment. Nevertheless, the same Volkhov Plant of Reinforced Concrete Items transferred 25 percent of the bonuses to its trust. According to the statute of 1964 25-50 percent of the formed bonus fund is left at the disposal of enterprises. In spite of this at the Volkhov Combine of Structural Components the entire fund is centralized in the superior organization.

The effectiveness of the established procedure of paying bonuses is determined by the end results which the national economy obtains from new equipment. The economic impact from its introduction in industry during the period of 1971-1982 increased by 1.8-fold and came to 3.9 billion rubles, the number of conditionally freed workers increased by 1.4-fold. During the 11th Five-Year Plan by means of the implementation of scientific and technical programs it is envisaged to obtain a saving of 16 billion rubles and to conditionally free 4.2 million workers. Of the 205 million tons of standard fuel, which it is proposed to save during the five-year plan, half should be saved as a result of the use of new equipment and advanced technology.

Unfortunately, the economic impact per ruble of expenditures during the indicated period practically did not change. The effectiveness of one measure on new equipment even decreased by 20 percent, since there was more so-called "minor theme work." The fact that approximately a third of the enterprises are not in a hurry to engage in earnest in the improvement of products and production technology on the basis of advanced scientific and technical achievements, also attracts attention.

The analysis of the financial results of the activity of industrial ministries for 1982 showed that the proportion of the profit from the development and introduction of new equipment is still low: for example, in the USSR Ministry of Power and Electrification--0.6 percent, the Ministry of the Gas Industry, the USSR Ministry of the Coal Industry, the USSR Ministry of Nonferrous Metallurgy, the Ministry of the Machine Tool and Tool Building Industry, the Ministry of the Automotive Industry, the Ministry of Construction, Road and Municipal Machine Building, the USSR Ministry of the Timber, Pulp and Paper and Wood Processing Industry, the USSR Ministry of Light Industry--3-5 percent, and the Ministry of Power Machine Building--8 percent. Moreover, in a number of ministries this proportion in 1982 was less than in 1970. But the profit is a generalizing criterion of the evaluation of production efficiency and, what is no less important, the basic source of the payment of bonuses.

In industry, according to the data for 1982, as a result of the introduction of new equipment the need for manpower resources was reduced by 450,000 people. This is 13 percent more than was achieved in 1970. However, the analysis of this indicator with respect to individual ministries shows that at a significant portion of them the influence of new equipment on the

saving of living labor decreased. The decrease of the efficiency of new equipment in the area of the reduction of the labor intensiveness of production under present conditions is a serious shortcoming.

However, the study of the results of the activity of ministries gives grounds to assume that the slight decrease of the impact (in the form of the increase of the profit and the decrease of the labor intensiveness of production), which is obtained by the introduction of new equipment, in many respects is connected with the changeover of industrial ministries during 1976-1980 to the cost accounting system of the organization of work on new equipment. This system makes increased demands on the economic impact. Now it should be not the accounting impact (at the stage of the compilation of the plan), but the actual impact after the introduction of new equipment in production.

The state is constantly increasing the allocations for the development of science. The number of scientists during 1950-1982 increased by 8.8-fold, the number of candidates of sciences--by 9.3-fold and doctors of sciences--by 4.8-fold. The national economy has the right to expect a significant contribution of science to the economic and social development of the country. The importance of the quickest solution of the problems, which are connected with the acceleration of the introduction in production of scientific and technical achievements and the substantial increase of their efficiency, is increasing.

Significant assets are being spent on the payment of bonuses for the development and introduction of new equipment. The bonuses for new equipment amount to approximately one-fourth of all special bonuses. On the average a worker who was paid a bonus in 1982 received a bonus of 59 rubles. As compared with 1970 its size has increased by 16 percent. The proportion of those paid bonuses for new equipment in the total number of workers of industry in 1982 came to 12.8 percent and during 1970-1982 had increased by 15 percent.

The sizes of the bonuses, which are paid to specific workers, are important for the evaluation of the role of stimulation. Sample surveys reveal the extensive differentiation of the payment of bonuses for new equipment by categories of workers and sectors of production. Whereas on the average the proportion of the bonuses for new equipment in the wage of a worker of industry, who was given incentives, in 1982 came to 2.5 percent, in the amount of all bonuses it is, of course, much larger. For example, for the director of the Konakovskaya GRES in 1982 the bonuses for new equipment in their total amount came to 15 percent, for the chief of one of the basic shops--21 percent. Here significant amounts of bonuses--respectively 9.9 percent and 10.8 percent--were paid from all sources to the indicated workers as a whole during the year. If the incentive for new equipment is assigned only to the amount of special bonuses, for the director it would come to 71 percent and the chief of the shop--74 percent, that is, it holds the leading place among the bonuses for individual important indicators of work.

Such facts are characteristic of the most different sectors. The director of the Moscow Petroleum Refinery in 1982 percent received for new equipment 13 percent of all the bonuses and 31 percent of the special bonuses, the chief mechanic of the plant--respectively 22 and 53 percent, the chief of one of the

basic shops--10 and 24 percent, the foreman--7 and 50 percent; the director of the Cherepovets Metallurgical Combine--19 and 32 percent, the chief mechanic--39 and 50 percent, the chief of one of the basic shops--22 and 53 percent; the director of the Izhorskiy zavod Production Association--38 and 57 percent, the chief mechanic--15 and 22 percent, the foreman--9 and 13 percent; the chief of the Moscow-Kursk Division of the Moscow Railroad--18 and 65 percent, the chief engineer--18 and 42 percent; the chief mechanic of the Elektrotsentromontazh Trust--21 and 100 percent, the chief of Installation Administration No 1 of this trust--15 and 36 percent and so forth. A distinctive feature of the cited examples is the larger bonuses of those who directly engage in the introduction of new equipment, they substantially exceed the average amount for the corresponding sector.

As is evident, the prevailing procedure of paying bonuses provides sufficiently great material stimuli to develop and introduce new equipment and technology and to improve the organization of production and labor. It should also be noted that the introduction of new equipment is stimulated not only by means of special systems, but also by another means--the impact from the introduction of the new equipment, which has been included in the plan of industrial production, is becoming a component of the basic results of economic activity, for which the corresponding bonuses are paid and are paid in significantly greater amounts.

The structure of the assets of the material incentive fund, which are credited for the introduction of new equipment, is of great importance. The profit from the decrease of the production cost as a result of the introduction of scientific and technical achievements and the profit from the markups on the price for new products should be the basic sources of these assets. The analysis of the available data shows that the structure of the indicated assets in many sectors of industry still does not satisfy the demands being made. The fact that this applies to the majority of scientific research institutes and design bureaus of machine building ministries, on the successful work of which the acceleration of scientific and technical progress in all industry and for the national economy as a whole depends, evokes particular regret. At the scientific research institutes and design bureaus of only three sectors the share of the basic sources of the payment of bonuses for new equipment slightly exceeded half of all the incentive assets and only in the Ministry of the Electrical Equipment Industry did it come to 62 percent. The share of the basic sources of the payment of bonuses is very low in the Ministry of Power Machine Building, the Ministry of Machine Building for Light and Food Industry and Household Appliances and the Ministry of Instrument Making, Automation Equipment and Control Systems. Among the sources of the incentive the estimated cost of jobs predominates, which is at variance with the basic goal of the cost accounting system of stimulation, that is, the impact from the introduction of new equipment does not have a direct influence on the improvement of such economic indicators as the increase of labor productivity, the increase of the profit, the decrease of the production cost and so on.

The role of the basic sources of the payment of bonuses for new equipment in the structure of the incentive funds of scientific production associations has been minimized. The possibilities of the advanced form of the combination of

science and pilot production, which is called upon to accelerate scientific and technical progress at the enterprises of the sector, are being used far from completely. Scientific production associations use mainly themselves their own scientific and technical developments. As a result, as the sample survey shows, in their material incentive funds the deductions from the profit, which was derived by means of the sale of industrial products, make up 50-80 percent.

From the analysis of the data of the USSR State Committee for Prices it follows that price markups should hold a more and more significant place in the stimulation of new equipment. On the average this committee annually approves over 3,000 new incentive markups and extends about 1,500 old ones in connection with recertification. Whereas in 1979 the size of the markups on prices on the average came to 3.5 percent, in 1981 it came already to 6.9 percent and in 1982 to 7.1 percent. Here the size of the markup on new equipment, which is based on discoveries and inventions, in 1981 came to 13.8 percent and on products with a significant decrease of the materials-output ratio and the labor intensiveness--to 12.2 percent.

At the same time markups are never established for a large portion of the products (for example, in the Ministry of Tractor and Agricultural Machine Building and the Ministry of the Chemical Industry it is over 95 percent). The awarding of the highest quality category to previously assimilated products, when in case of certification there is no additional impact, and the nonconformity of new products to the requirements of the highest quality category are the basic causes of such a situation. Thus, according to the data of the State Committee for Standards, at the enterprises of the Ministry of Tractor and Agricultural Machine Building the proportion of products with the Emblem of Quality in 1981 came to 23.7 percent. Here of the 27 new types of products planned for assimilation the production of 22 was actually begun, while only 1 was certified as being of the highest category. In the Ministry of the Chemical Industry with a proportion of products of the highest quality category of 27.5 percent in 1981 it was planned to certify one item as being of the highest category, while in fact none was certified. Moreover, as a rule, price markups are not being established for a large number of types of products (for example, items of tool and founding shops, for products which have not an economic, but a social impact).

In spite of this, the additional deductions for the material incentive funds at the expense of the markups on the prices for new highly efficient products come to significant amounts. In the Ministry of the Electrical Equipment Industry, for example, these deductions in 1981 came to 9.6 percent of the planned material incentive fund, in the Ministry of the Automotive Industry--10.9 percent, the Ministry of the Machine Tool and Tool Building Industry--13.2 percent and the Ministry of Heavy and Transport Machine Building--17.2 percent. For individual enterprises they were even greater: at the Elektrostaltyazhmash Production Association--30.2 percent, the AvtoZIL Production Association--33.7 percent, the Kolomna Machine Tool Building Production Association--49.6 percent, the Ivanovo Machine Tool Building Production Association--56.5 percent. At the Bryanskiy mashinostroitelnyy zavod Production Association the additional deductions for the material incentive fund exceeded its planned amount.

Thus, it is possible to draw the conclusion that individual enterprises, which engage in earnest in the increase of the technical level of the output being produced, additionally obtain a substantial addition to the available assets of material stimulation. However, so far this has not become widespread.

The differentiation of the standards of the deductions for incentive funds from the profit, which was derived due to the decrease of the production cost as a result of the introduction of new equipment, is an important question. Experience of creating preferability in the stimulation of new equipment, which is of great national economic importance and has a high level of the technical and economic indicators, has been gained in a number of sectors of industry (chemical, petroleum refining, coal, light and others). As a rule, all the operations on new equipment are divided into three groups. The operations, which have been included in the State Plan of the Development of Science and Technology, the developments, the technical and economic indicators of which exceed the world level or they have been performed at the level of inventions, and the operations, which have been awarded the State Emblem of Quality, are assigned to the first group. Those, which are envisaged in the sectorial plan, are assigned to the second group, and all others are assigned to the third group. The standard of deductions, which has been established in the sector, is used only for operations of the first group, a standard which has been reduced by 20-30 percent--the second group, and a standard which has been reduced more (by approximately 50 percent of the standard established for the sector)--for operations of the third group.

The experience of the coal industry in the development of cost accounting principles of the stimulation of new equipment is of interest. The procedure of the mutual responsibility of the participants in the development and introduction of new equipment is used in the sector. Scientific research institutes and design bureaus bear responsibility for the technical and economic parameters of the development and the guaranteed economic impact: if they are not ensured, the deductions for the incentive funds of the scientific research institutes and design bureaus are reduced. The enterprises are responsible for the complete and efficient use of developments in conformity with the supply orders (contract), if they do not fulfill their obligations on the extent of the introduction of new equipment and through their fault its planned efficiency is not achieved, it is necessary to transfer to the funds of the developer in addition to the assets, which have been credited from the actual impact, assets which are equal to half of the impact which failed to be obtained.

The goal-oriented use of the formed material incentive fund is of great importance. Two basic forms of stimulation at the expense of the assets of this fund: one-time bonuses for a specific development and bonuses for the fulfillment of the quarterly thematic plans, are envisaged by the prevailing procedure. The first form is more preferable, since those who directly participate in the development and introduction of new equipment are stimulated in this way. The use of the cost accounting system of stimulation should promote the use to a greater extent of one-time bonuses. This is confirmed by the experience of several sectors. Thus, whereas in 1980 at the scientific research institutes and design bureaus of the coal industry 37 percent of the fund was spent for the payment of one-time bonuses from the

material incentive fund, in 1982 already 56.2 percent of it was, respectively 30.1 and 12.7 percent was spent for the payment of quarterly bonuses. However, in many sectors of industry preference, as before, is being given to quarterly bonuses.

For the purpose of improving the material stimulation of workers in conformity with the cost accounting system of the organization of operations on new equipment on the basis of supply orders the following proposals, in our opinion, merit attention.

1. To envisage as mandatory the differentiation of the amounts of the deductions for the incentive funds of scientific research institutes and design bureaus (the material incentive funds of enterprises) for the development of new and the improvement of prevailing technological processes subject to the scientific and technical level of the developments, in order to ensure an increased interest in the output of products which in their technical and economic indicators conform to the highest world level.

At present the right to differentiation the amounts of the deductions has been granted to the ministries.

2. To retain the estimated cost of scientific research, design, technological and experimental design operations as a source of the material incentive for the stimulation of only those operations, the results of the performance of which are not expressed as an economic impact.

According to the prevailing procedure it is also permitted to use the estimated cost of operations as a source of the incentive in case of the stimulation of the development of systems and sets of machines with the use of equipment, which is produced by industry, and the development of new technology in accordance with the orders of other sectors.

3. In order to eliminate the use of the estimated cost of operations as a source of the incentive, to grant ministries and departments the right to permit subordinate associations, enterprises and organizations to transfer a portion of the assets of the incentive funds, which are formed by means of deductions from the profit which is derived from the decrease of the product cost, to the enterprises, organizations and higher educational institutions of other sectors, which take part in the performance of any operations on the development of new and the improvement of prevailing technological processes.

At present it is permitted to transfer assets of the incentive fund from one sector to another only by means of markups on the price for highly efficient products and for the improvement of production technology in conformity with all-union scientific and technical programs.

4. To decrease the amounts of the deductions for the incentive funds for the development of new and the improvement of prevailing technological processes and for the development and production of new highly efficient products in case of the violation of the planned date of the completion of the operations on new equipment.

At present the violations of the set dates are not taken into account.

5. To permit enterprises to use the assets for the stimulation of the development and introduction of new equipment, which were deducted for the material incentive fund, but remained unspent after the payment of all the due bonuses, for the payment of a reward for the overall results of the work in accordance with the results of the year or in other directions of the use of the material incentive fund.

According to the prevailing procedure only scientific research institutes and design bureaus can spend these assets in this way. A similar right has been given to the enterprises of machine building ministries, which have been converted to the large-scale economic experiment.

6. To give the workers of enterprises an incentive for the output of new highly efficient products, paying not only one-time bonuses for the fulfillment of specific operations on the development and assimilation of their production, but also quarterly bonuses for the fulfillment of the plans on the output of the indicated products.

The principle of the stimulation of the workers of enterprises for new equipment is a one-time principle, the bonus is paid after the completion of the development and introduction of a specific type of new equipment regardless of the other indicators of the work. The indicated bonuses are paid to the managerial personnel of enterprises on the condition of the fulfillment of the plan on new equipment by the cumulative total from the beginning of the year. The need to deviate from the above-indicated principle is connected with the fact that for new highly efficient products the incentive assets from the markup on the price under specific conditions can be received for up to 7 years. Therefore, after 1-2 years the stimulation not so much of those, who engaged in the development, assimilation and introduction in production of the indicated product, but of those, who subsequently ensure its production, becomes important.

7. To abolish the payment of bonuses for the transfer of scientific and technical achievements in the sectors which have been converted to the cost accounting system of the organization of operations on new equipment.

The same sources are envisaged for the payment of bonuses for their transfer as in case of the cost accounting system: the material incentive fund, the centralized fund for the payment of bonuses. Moreover, it should also be permitted here to transfer the incentive assets for the stimulation of the creators of new products from one sector to another, in which the developers of these products work.

8. The need exists for all ministries to prepare sectorial recommendations on the procedure of determining the personal labor contribution of individual workers to the overall result on the development and introduction of new equipment with allowance made for the specific nature of the sector.

At present recommendations have been prepared only in individual ministries and their lack in the majority of sectors is creating the basis, as surveys show, for the "flourishing" of leveling in the payment of bonuses.

At the same time it is necessary to improve the material incentive in those sectors, in which not the cost accounting system of the organization of operations on new equipment, but the Statute which was approved in 1964 is being used.

For this, in our opinion, the following is required:

--To stipulate that the bulk of the bonus (not less than 70 percent) would be paid after the completion of the work on the development and introduction of new equipment (according to the prevailing procedure it is permitted to pay up to 70 percent of the amount of the bonus for individual stages).

--To determine the sizes of the bonuses subject to the actual economic impact (according to the prevailing procedure the accounting impact is the basis of the determination of the size of the bonus).

--To establish that only the workers, who take a direct part in the development and introduction of new equipment, are paid bonuses for this (according to the prevailing procedure it is permitted to allocate up to 10 percent of the amount of the bonus for the payment of bonuses to workers who actively contribute to the development and introduction of new equipment).

In conclusion I would like to make another suggestion: there should be an approved plan of the introduction of new equipment and technology already at the stage of the drafting of the State Plan of the Economic and Social Development of the Country. Then it would be possible to see to what extent by means of the introduction of scientific and technical achievements it is possible to increase labor productivity and to decrease the need for manpower resources, to decrease the production cost and to increase the profit, to save fuel, energy and other most important types of material resources. In such a case scientific and technical progress would become an even more reliable means of increasing production efficiency and speeding up the intensification of the economy.

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ORGANIZATION, PLANNING AND COORDINATION

RESOURCE CONSERVATION THROUGH ADVANCED TECHNOLOGIES

Moscow IZVESTIYA in Russian 29 Jun 85 p 2

[Article by Deputy Chairman of the USSR State Committee for Science and Technology V. Kudinov: "We Will Be Thrifty"]

[Text] At the present stage of the development of the national economy the utmost saving of resources is acquiring an especially important role. This was discussed at the recent conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress. The task is for 75-80 percent of the increase of the need of the national economy for fuel, raw materials and materials to be met by their saving. And the key to its accomplishment is first of all the use of scientific and technical achievements.

In the past years of the five-year plan definite gains have been made in this direction. In particular, the implementation of all-union scientific and technical programs will make it possible to save in 1985 4 million tons of ferrous metals, 200,000 tons of nonferrous metals and 14 billion kWh of electric power.

However, in spite of definite positive changes, as a whole, it must be admitted with all frankness that scientific and technical progress is still developing slowly. The USSR Ministry of Ferrous Metallurgy, the Ministry of the Chemical Industry, the USSR Ministry of the Construction Materials Industry, the Ministry of the Petroleum Industry, the Main Administration of the Microbiological Industry and the USSR Ministry of Power and Electrification did not once fulfilled the plans of the introduction of new equipment during all 4 years of the 11th Five-Year Plan.

In 1984 the enterprises of the USSR Ministry of the Construction Materials Industry, the USSR Ministry of Ferrous Metallurgy, the Ministry of the Chemical Industry, the Ministry of Transport Construction, the Ministry of the Electrical Equipment Industry and the USSR Ministry of Agriculture allowed the largest lag with the fulfillment of the assignments of the all-union scientific and technical programs.

What are the reasons for such a state of affairs? There are fundamental things here which merit the most serious attention. As the analysis shows,

the ministries are not seeing to the backing in good time of the fulfillment of the assignments in accordance with the programs with all types of resources, particularly capital investments and limits of contractual work. Here are the facts. It was envisaged by the assignments of the programs to put into operation in 1981-1984 466 projects which are necessary for the development of new equipment and technology. Of them 58 projects were excluded altogether from the ministerial plans, while 108 had to be postponed to later dates due to the fact that the ministries and departments did not allocate capital investments or did not organize their assimilation. The plan of capital investments and construction and installation work on the development of experimental bases of scientific research organizations of machine building is systematically not being fulfilled.

But as a result there are losses and unused reserves. Moreover, this is most noticeable wherever the problem is of an intersectorial nature. Let us take, for example, the protection of metals against corrosion. This is truly a most important national economic problem. Annually the country loses from corrosion many millions of tons of metal in items and structures. Their failure causes significant harm. At the same time in the past 10 years, given the 65-percent increase of the metal stock of the country, the amount of rolled products with a protective coating has increased by only 10 percent; less than half of the needs of the national economy for corrosion protection agents are being met. As a result considerable forces and assets are being diverted for the repair of equipment.

Another no less important problem is the decrease of the losses from wear. For this reason today the consumption of metal for spare parts in the automotive and tractor industry alone is beginning to exceed the consumption of the metal which is used for the production of new machines.

Today our country produces more steel than any other country in the world. At the same time we produce from it substantially fewer products, since the materials-output ratio of machines is intolerably high. The utilization ratio of metal on the average for the country comes to 0.7. In other words, nearly a third of the metal becomes scraps. In individual cases they amount to 70 80 percent. If by means of the introduction of advanced technology the ratio is increased to 0.8, and this is entirely practicable, the saving of ferrous metals in machine building would come to more than 4 million tons.

Scraps are an important source of raw materials in many sectors of industry. However, they are being used poorly. More than 8 billion tons of solid waste, which is formed during the mining and dressing of coal, ash and cinders of thermal electric power plants, slimes of the metallurgical industry and waste products of the timber, wood processing and pulp and paper industry, municipal services, agriculture and the food and light industries have accumulated in the country.

Meanwhile ash and cinders are fine raw materials for the production of cement, brick, keramzite and other construction materials. According to the estimates of specialists, from the waste products of just only modern thermal electric power plant it is possible to build tens of buildings. Each ton of ash, which is put to use, saves the state 15 rubles.

It is well known that every ton of petroleum is more and more expensive. This trend will also be maintained in the future, as has already been noted in the press. Over 500,000 tons of oil sludges--a mixture of petroleum, waste and rock particles--form annually at enterprises of the USSR Ministry of the Petroleum Refining and Petrochemical Industry. Until recently they were discharged into storage ponds, which as a result turned into entire "seas": more than 5 million tons of oil sludges have been accumulated in them. The ministry made the decision to burn them, having developed for this special furnaces. But petroleum makes up 40-60 percent of the oil sludges.. It is possible to extract it by means of centrifuges, obtaining annually hundreds of tons of pure petroleum.

This is far from a complete list of the examples. But it convincingly attests to what reserves of the efficient use of resources it is possible to put to use.

The question naturally arises: What is being done and what still needs to be done for the successful solution of this problem? Domestic and world experience testifies that the lion's share--up to 80 percent--of all the achievements in the saving of material, energy and manpower resources is provided by resource-saving technologies.

Let us take, for example, welding. It makes it possible to save metal, increases labor productivity and cuts nearly in half the production cycle and the labor intensiveness of the production of metal components. One of the latest achievements is the development of the Sever robot for the welding of main gas pipelines. This problem for long years was insolvable, welding was performed by hand and required an enormous number of welders of the highest skill. An experienced welder welds a joint in one shift, the Sever welds it in 8 minutes.

Another example is the technology of obtaining superhard materials. This major achievement of basic science had a profound influence on technical progress. Thus, for example, the use of tools made of synthetic superhard materials at the Sayanskiy Stone Milling Combine increased the productivity of milling by 14-fold and for the first time in world practice made it possible to carry out the entire cycle of the surface finishing of granite. In a number of cases this led to the organization of mechanized flow lines, for example, in case of the finishing treatment of the holes of cylinders and sleeves, motor vehicle and tractor engines, the grinding of hard alloy parts and in a large number of other processes.

In the area of the production of refractory materials by means of the replacement of obsolete energy-consuming processes with the technology of self-propagating high temperature synthesis the consumption of energy is reduced to less than one-tenth with the simultaneous decrease of the product cost and the 20-fold increase of labor productivity.

Such technologies as laser, plasma and powder technology and biotechnology are affording fundamentally new opportunities. It is possible to expect a qualitative change of the economy in precisely these directions. Superhigh pressures, high and superhigh temperatures and explosion energy have become

firmly established in the arsenal of the modern technology which governs the technical progress of many sectors. These extreme parameters make it possible to accomplish changes of substances, which are inconceivable within traditional processes.

It follows from what has been said: so that the material and raw material potential could maintain a high growth rate of the economy without the substantial quantitative increase of the volumes of the extraction of raw materials, materials and energy carriers, it is absolutely necessary to develop consistently and to introduce extensively resource-saving technology. There is no alternative to this direction. At the April (1985) CPSU Central Committee Plenum it was stressed that revolutionary changes are needed--the changeover to fundamentally new technological systems and to equipment of the latest generations, which provide the greatest efficiency. It is a question in essence of the retooling of all the sectors of the national economy on the basis of the present achievements of science and technology.

At the recently held meeting of the USSR State Committee for Science and Technology the problems of speeding up the implementation in the national economy of the achievements of scientific and technical progress, which are aimed at the saving of raw materials and materials, were examined from precisely such a point of view. Many executives of ministries and departments, prominent scientists and specialists took part in its work. It was deemed necessary that ministries and departments would actively participate in the work on the State Program of the Implementation of the Most Important Scientific and Technical Measures in the Area of the Increase of the Efficiency of the Use of Material and Raw Material Resources in the National Economy.

In this program the amounts of the saving for 15 types of the most important material resources are specifically established for each ministry. The fulfillment of the assignments will ensure the obtaining of not less than 70 percent of the total planned saving. A useful suggestion, in our opinion, was voiced during the discussion of the "mechanism" of the implementation of the state program. Its essence consists in the fact that on the basis of the developed technologies and new construction materials, which provide a potential saving of raw materials and materials, the State Committee for Science and Technology would prepare suggestion for planning organs, while the latter in turn would decrease the allocation to sectors of the corresponding resources, thereby stimulating the introduction of new technologies.

Much attention was devoted to the questions of the acceleration of the establishment of an all-union bank of technologies and the organization on its basis of systematic work on the monitoring of the scientific and technical level of sectors and the estimation of the influence of advanced technologies on structural changes in the economy. The questions of the realization of the fundamental directions of the organization of the "science-technology-production" process, including on the basis of the establishment of large sectorial and intersectorial technological centers and scientific production associations, which will create the prerequisites for intersectorial cooperation in the most important link of production--technology--will hold an important place in the forthcoming work. Success in the matter of solving a

vital question of the economic policy of the party--the acceleration of scientific and technical progress--in many ways depends on the quick and efficient accomplishment of these tasks.

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ORGANIZATION, PLANNING AND COORDINATION

ENERGY-BIOLOGY COMPLEXES BASED ON POWER PLANT WASTE WATER

Moscow IZVESTIYA in Russian 15 Jun 85 p 2

[Article by IZVESTIYA science commentator B. Konovalov: "The Cinderella of Power Engineering"]

[Text] In the article "What Else the Electric Power Plant Can Do," which was published in No 358/359 of IZVESTIYA for last year, the possibility of combining our two most important state programs--the Food Program and the Energy Program--was spoken about. The means to this is the establishment of energy-biology complexes based on the warm waste water of nuclear and thermal electric power plants.

Let us recall the basic idea of the article. Two-thirds of the energy of the fuel being burned for the present is carried away with the warm waste water. In our country it is more than the annual discharge of the Volga. In power engineering alone we now waste annually over 250 million tons of standard fuel. This greatly exceeds the annual output of our largest coal basin--the Kuzbass. The value of the warm river is many billions of rubles. And they can become a profit, and not losses.

The article tells in detail about the first energy-biology complex (EBK) under construction at the Kurskaya Nuclear Electric Power Plant. A fish cannery, an experimental hothouse, a mushroom cellar and a microbiological works should operate within it. It was said that, unfortunately, the implementation of the valuable idea had been dragged out for 12 years. The enthusiasts were forced immediately to agree to the establishment of an industrial energy-biology complex, because the experimental base of the All-Union Scientific Research Institute of Planning of Hydroprojects imeni S. Ya. Zhuk in Elektrogorsk is very weak.

The article, which was published under the heading "On the Agenda of Ministries and Departments," made the appeal to speed up sharply the pace of the work on the establishment of energy-biology complexes and to include them in the plans of thermal and nuclear plants which are being newly built. In such cases the editorial office should receive official replies on the taken steps. And now they have begun to arrive. Calm, euphoric ones: everything is going, they say, as expected, and IZVESTIYA has begun to sound the alarm in vain.

"The development of the basic technical and technological components of production energy-biology complexes for the purpose of their further introduction is planned at the experimental energy-biology complex in Elektrogorsk," it is stated in the reply of the Main Administration for Planning and Scientific Research Work (GlavNIIproyekt) of the USSR Ministry of Power and Electrification, which is headed by L. M. Voronin, "the work on planning has been included in the plan.... The completion of construction is planned in 1988...."

Judging from how things are really going, this date is also too optimistic. The experimental base in Elektrogorsk is now in such a state that it is impossible to look at it without shuddering. The emergency buildings are deteriorated. The new equipment for experimental plants is out in the open. The shed, in which they wanted to put this equipment temporarily, is lying for the second year on the shore of the pond. But they are allowing the shed to be erected. The correspondence on the allotment of 2 hectares of land for the base has dragged out for 2.5 years.

In December 1982 the Pavlovskiy Posad Soviet Executive Committee adopted the decision to transfer a plot of land 2 hectares in area to the All-Union Scientific Research Institute of Planning of Hydroprojects imeni S. Ya. Zhuk. But to date this decision has not been approved by the Moscow Oblast Soviet Executive Committee. Moreover, N. I. Ustin--the director of the Elektrogorskaya GRES-3, on the warm water of which the experimental energy-biology complex should operate--stood in the way of the new matter. He has so far not given consent to the connection of the base to the networks of "his" GRES.

N. I. Ustin did not respond to the direct question of why he is hindering the matter, but immediately took refuge in the superior organization:

"The Moscow Regional Administration of Power System Management should settle everything."

He refers to the Moscow Regional Administration of Power System Management in vain, it has a letter of D. F. Protsenko, chief of the Main Administration for the Exploitation of Power Systems in the Center (the Moscow Regional Administration of Power System Management is also subordinate to it), in which it is written in black and white: "Give assistance to the All-Union Scientific Research Institute of Planning of Hydroprojects imeni S. Ya. Zhuk in coordinating the allotment of land," "issue the specifications of the delivery of heat and electric power."

Instead of assistance this winter the only heated building at the base was disconnected from the heat supply, and the radiators burst.

While we waited for N. I. Ustin, we had the opportunity to study on the stands the indicators of the operation of the plant and the socialist obligations. In 1985 the GRES-3 imeni R. E. Klasson should release to consumers 330 million kWh of electric power. Hence, its maximum cost is 6.6 million rubles. In the socialist obligations it is stated: to give patronage assistance to

agriculture in the amount of 35,000 rubles. And there is another point: to raise 20 piglets.

But let us now estimate what the effective solution of the problem of energy-biology complexes can yield. Let us take just one standard 1 million kW unit of a thermal or nuclear electric power plant. According to the calculations of specialists, in a year an energy-biology complex, which operates on the waste water of this unit, can provide 6,000 tons of fish, 25,000 tons of products of plant growing from outdoor heated ground, 20,000 tons of vegetables from hothouses, 1,000 tons of mushrooms, 1,500 tons of microbiological products, including scare protein compounds for the feeding of fish. In all this is worth approximately 40 million rubles.

Let the entire GRES-3 work entirely just on the solution of this problem, this alone would justify its existence, if you approach the matter in a practical way.

But the point is that they will strictly penalize Ustin for the 20 piglets. If he were not giving patronage assistance to agriculture, they could remove him from his position. But he does not bear any responsibility for the fact that the warm water is being discharged to no good into the pond. And not just he--the entire ministry. No one is held accountable for the fact that an entire Volga of warm water is flowing away uselessly. It is the cost, they say, of technology. But there is a means of turning the "cost" into food.

I do not believe that within the Ministry of Power and Electrification it is impossible to obtain satisfaction from the "obstinate" N. I. Ustin. The root lies in the fact that here they are inclined to regard the problem itself as an extraneous one, not one of power engineering. One manager stated his opinion frankly: "We got mixed up in some sort of biology."

In the reply of the Main Administration for Planning and Scientific Research Work it was stated: "Not one department, including the USSR Ministry of Power and Electrification, has the necessary specialists for the establishment and operation of energy-biology complexes. This problem is at the junction of the interests of many departments. Therefore, the establishment of an extradepartmental organ--the All-Union Scientific Production Association for the Complete Use of Secondary Energy Resources--is necessary for its successful solution."

Indeed, the RSFSR Ministry of the Fish Industry (fish breeding equipment, feed), the USSR Ministry of Agriculture, the Ministry of the Fruit and Vegetable Industry (plant growing, mushroom growing, hothouses), the USSR Ministry of Machine Building for Animal Husbandry and Fodder Production and the USSR Main Administration of the Microbiological Industry (the recovery of the waste products of plant growing and the fish industry) should take part in the establishment of the energy-biology complex. But consider the meaning of the "bold" idea of the Ministry of Power and Electrification. First, it is a question of the establishment of a new institution, the formation of which will take years, which it is hardly possible to regard as a constructive step in the direction of the solution of the problem. But, second, the Ministry of Power and Electrification knows perfectly well the procedure of the

establishment of new scientific production organizations. The ministry or department, which is establishing the organization, submits the proposal. It is considered by the USSR State Planning Committee and the USSR State Committee for Science and Technology and, after their endorsement, by the USSR Council of Ministers. But if the association is an extradepartmental one, hence there is no one to submit an official proposal.

The means for solving intersectorial problems of this sort was outlined in the decree of the CPSU Central Committee and the USSR Council of Ministers "On Measures on the Acceleration of Scientific and Technical Progress in the National Economy." It envisaged the setting up of temporary collectives for solving scientific and technical problems of an intersectorial nature. In accordance with the statute a reserve of assets of the USSR State Committee for Science and Technology should be formed for the additional financing of operations by means of deductions from the unified funds for the development of science and technology of ministries and departments.

But then the statute on the temporary collective was issued. There it is stated that they should be set up once again by ministries and departments at their own expense, and only in individual cases in accordance with the suggestions of the USSR State Committee for Science and Technology itself.

As a result given the abundance of intersectorial problems on 1 January 1985 only one temporary collective had been set up. Why should ministries "make an unnecessary fuss," if they should set it up by means of their own money and funds? It is possible, as before, to work in accordance with contracts. This solution also does not attract enthusiasts, because the temporary collective is set up only for 3 years. In this time it is difficult to solve an important complex problem. And what happens after 3 years? You have already left your organization, now head in all four directions. Nowhere is it stated that, if the matter proves to be promising and the results prove to be fruitful, the temporary collective can become the germ cell of a new organization.

In the article "What Else the Electric Power Plant Can Do" there were reproaches meant for the USSR State Committee for Science and Technology and an appeal to increase the financing of operations and to set up a temporary collective for the solution of the problem of energy-biology complexes. The editorial office has not receive a reply from the USSR State Committee for Science and Technology, but the matter deserves more active support.

The USSR State Committee for Science and Technology does not want to take under its wing the establishment of intersectorial organizations, believing that the committee should deal only with comprehensive programs and not bind itself with responsibility for the practical activity of interdepartmental collectives. But who will assume this burden? The Academy of Sciences? But often these intersectorial problems, like, for example, the ones we are discussing, are not at all of an academic nature. The State Planning Committee? It has enough worries as it is. Who else is there?

In any case, as to the use of warm waste water, the Ministry of Power and Electrification does not have any moral right to "push" this problem on others.

There are no specialists? That is not true. There are more than enough of them in the country. Specialists of more than 20 organizations of different ministries and departments, who are necessary for the solution of the problem of energy-biology complexes, have united around the Department of the Study of Complex Biological Problems in Power Engineering of the All-Union Scientific Research Institute of Planning of Hydroprojects imeni S. Ya. Zhuk and are working in accordance with contracts. If there are too few of them, conclude a contract with the USSR Ministry of Higher and Secondary Specialized Education, where there are 500,000 scientists. Of course, it is more difficult to organize their work than to pose the question of a new organization. But it is necessary to start.

While a specialized scientific production association for the use of secondary resources, if directive organs recognize the advisability of its establishment, is also quite capable of operating within the Ministry of Power and Electrification.

Unfortunately, the reply to the editorial office of A. A. Troitskiy, chief of the Department of Power Engineering and Electrification of the USSR State Planning Committee, in its nonchalant tone is reminiscent of the ministerial reply: "After the development and operational development of energy-biology complexes on an experimental module it will be possible to begin the extensive construction of the indicated complexes at nuclear and thermal plants and industrial enterprises."

Hence, as before the possibility of setting up energy-biology complexes will not be envisaged in the plans of new plants. But it is clear to any engineer that it is one thing to install an energy-biology complex at an operating electric power plant and a quite different thing to incorporate this in a plan from the very start.

As is correctly noted in the reply of USSR Deputy Minister of the Fish Industry B. D. Monakov, "the experience of operating the built warm water systems in the country shows that it is necessary to begin the designing of such fish breeding project at the same time as the designing of GRES's and nuclear electric power plants."

It is time for us, of course, to calculate not only the profits, but also the losses. But the fact that new plants are being put into operation without energy-biology complexes, is planned losses. Now according to the preliminary plans of the Energy Program we should annually put into operation new blocks of nuclear electric power plants with a total rating of 10 million kW. Hence, at new nuclear electric power plants alone we will annually lose the possibility of obtaining food products worth hundreds of millions of rubles.

At the June conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress it was stated that "resource conservation should be one of the main directions of investment policy." If

they called the Ministry of Power and Electrification and the corresponding department of the USSR State Planning Committee to account not only for the generation of electric power and heat, but also for the utilization ratio of the allocated fuel resources, many problems would be solved more easily. But at present the life of the workers of the state machinery is in no way affected by whether they help the country to save resources or, on the contrary, contribute to their squandering. It is necessary to change this situation as quickly as possible. Then the Volga of warm discharges will quickly be turned into a brook and food complexes will cease to be "the Cinderella of power engineering."

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ORGANIZATION, PLANNING AND COORDINATION

PROBLEMS IN DEVELOPMENT OF PLANT SECTOR OF SCIENCE

Kishinev SOVETSKAYA MOLDAVIYA in Russian 26 Jul 85 p 2

[Article by B. Belenkiy and L. Popelkova: "The Plant Unit of Science. The Problems of the Increase of the Yield of Plant Science Are Discussed at the Round Table of SOVETSKAYA MOLDAVIYA and the Kishinev City Party Committee"; passages rendered in all capital letters printed in boldface in source]

[Text] In the set of measures on the acceleration of scientific and technical progress, which were outlined by the April (1985) CPSU Central Committee Plenum and at the conference in the CPSU Central Committee, an important place is assigned to the problems of stepping up the activity of the plant unit of science, which operates directly at the enterprise and is closely connected with it organizationally and economically. How does it function? How great is its yield? What problems is it necessary to solve so that the plant sector of science could influence more actively the increase of the pace of scientific and technical progress?

All these and many other questions became a topic of the round-table discussion. Vice President of the Moldavian SSR Academy of Sciences V. Andrunakiyevich; Academician Secretary of the Physical, Technical and Mathematical Sciences Department D. Gitsu; Chief of the Science Department of the Moldavian SSR Ministry of Higher and Secondary Specialized Education S. Gazhim; Chief Engineer of the Vibropribor Production Association G. Kuzmichev; Director of the Kodry PDK [expansion unknown] V. Formagey; Chief Engineer of the Plodselkhozmash Production Association Yu. Mitsek; Director of the Planning, Design and Technological Institute of the Ministry of the Food Industry N. Aleksandrov; Chief Engineer of the Moldavgidromash Production Association V. Kurteyev; Secretary of the Party Committee of the Schetmash Plant V. Shvarov; Director of the Elektromashina Plant V. Karabylo; Chief Engineer of the Volna Production Association N. Shindin; Deputy Director for Economics of the Combine of Artificial Leather and Industrial Rubber Items imeni Kalinin L. Debner; Prorector for Science of Kishinev Polytechnical

Institute K. Glushko; Chief Engineer of the Institute of Electrical Instrument Making of the Mikroprovod Scientific Production Association Ye. Badinter; Chief Specialist of the State Planning Institute for the Planning of Enterprises of the Fruit and Vegetable Industry [Giproplodoovoshchprom] L. Goryainov; as well as L. Kazakov, A. Kostomin and P. Palamarchuk, specialists of the Tiraspol Plant of Casting Machines imeni S. M. Kirov, the Bendery Elektroapparatura Plant and the Beltsy Locomotive Depot, took part in it.

THE GAINED EXPERIENCE TESTIFIES TO THE GREAT POSSIBILITIES OF THE PLANT SCIENTIFIC UNIT. THE TASK IS TO DISSEMINATE EVERYTHING VALUABLE EVERYWHERE.

In the development of its scientific unit, Second Secretary of the Kishinev City Party Committee V. Pshenichnikov noted in opening the meeting, every enterprise has gone its own way. At some sectorial scientific research institutes or their affiliates operate today, at others design bureaus constitute the basis of the plant sector of science, at still others the central plant laboratories and the services of the chief specialists act as the generators of scientific ideas.

But the essence is not in the difference of the organizational forms. Today it is much more important to standardize the understanding of the tasks of the plant sector of science, since this in many ways determines the efficiency of its activity. What goals should plant researchers set for themselves? First of all to speed up the process of updating equipment and technology, to bring the products of their enterprise up to the highest quality level, to improve the organization and productivity of labor, to improve management.

At the Vibropribor Production Association the special design and technological bureau constitutes the nucleus of plant science. Precisely specified guidelines enable researchers to concentrate on the solution of the most urgent tasks for the enterprise. As a result the problem of introduction here has been removed from the agenda. The process of assimilating new equipment has been shortened by one-half. This became possible owing to the fact that scientific research development and the technological preparation of production for the output of new equipment take place simultaneously. Such an approach is enabling the workers of the Vibropribor Association to plan genuinely great gains. For the 12th Five-Year Plan it is planned here to produce 27 new items on the basis of a modern element base and microprocessors.

At the Elektromashina Plant the concept of the plant sector of science goes beyond traditional notions. Here they are attempting to involve in scientific research not only engineers, but also technicians and leading workers. The adding up of forces at different levels is yielding definite success. At the same time at the enterprise the work on dissertations of plant specialists is encouraged, here they see in this a definite reserve of creative thought. Three specialists have already defended candidate dissertations. Their themes were suggested by the needs of production, while the conclusions are being implemented in practice. The use of glass enamel instead of stainless steel,

which is based on one of the dissertations, is already being used in practice and is providing a large economic impact.

TO UTILIZE FULLY THE AVAILABLE POTENTIAL, TO ERADICATE WORK ON MINOR THEMES, TO COOPERATE CLOSELY WITH SECTORIAL SCIENTIFIC RESEARCH INSTITUTES--ONE OF THE MAIN TASKS OF PLANT RESEARCHERS LIES IN THIS.

Experience convincingly attests to the significant possibilities of plant science. At the same time, as was noted at the meeting, the cases, when the potential of plant specialists is being under without the proper return, when their activity is governed by "momentary" problems, are still frequent. This also gives rise to work on minor themes and the dispersal of forces. The way out of the situation is obvious: to develop in every possible way contacts with sectorial, academic and educational institutions. There are many examples of this sort of efficient cooperation.

The Moldavgidromash Association has traditionally strong ties with the polytechnical institute. The affiliates of the chairs of the higher educational institution at the enterprise have brought scientists of the higher educational institution and plant researchers closer and have made it possible to solve together the most difficult problems. The contact with the institute has also left its mark on the level of research work of the specialists of the enterprise. They annually receive 25-28 certificates of authorship for inventions at the association.

Of course, the speakers noted, the nature of the contacts of enterprises and institutes can be most different. However, as experience shows, their merging within an association yields the greatest impact. One can see this well from the example of the Mikroprovod Scientific Production Association. Here the interaction of specialists of the plant sector of science and the associates of the scientific research institute is having a fruitful effect. The production workers sense better the requirements of consumers and are having a stimulating effect on the institute. The combination of efforts made it possible to shorten significantly the "development-introduction" cycle. As a result, whereas during the 15 years prior to the association the institute introduced at the plant only 3 items, during the past decade it has introduced 75. The sectorial institute is capable also of influencing the increase of labor productivity at the enterprise. The controllers, which were developed at the Scientific Research Institute of Electrical Instrument Making, made it possible to increase labor productivity during measurement by three- to fivefold, while the program of robotization, which is being implemented at the plant, posed for the institute another task: to see to it that the designs and technologies of new items could be robotized.

At the meeting, however, such cases, when several sectorial scientific research institutes work in isolation of production, were also noted. The Schetmash Plant, for example, has three basic developers. Each of them has its own design and technological stereotypes. As a result today the enterprise is forced to use five types of technology of the production of printed circuit boards, for each of which its own expensive equipment is necessary. Incidentally, one of the research institutions is located directly

at the plant. Is it not advisable to combine the potentials of this institution and the plant?

In the opinion of the meeting participants, the scientific research institutes, which are oriented toward the solution of intrasectorial problems, should be combined more resolutely with the enterprise, while the other sectorial institutes should encompass more extensively the complex problems which are of an intersectorial nature.

THE ENGINEER IS THE LEADING FIGURE OF THE PLANT SECTOR OF SCIENCE. HOW IS HIS CREATIVE ACTIVITY TO BE STIMULATED?

The engineer, it was emphasized at the meeting, is a bridge between science and production. And the greater the capacity of this bridge is, the closer the goals are. Unfortunately, the working time of the engineer at the enterprise frequently is used extremely inefficiently. At the Special Design and Technological Bureau of the Plant of Casting Machines imeni S. M. Kirov, for example, in 1983 over 64,000 engineering hours were lost. On what were these hours spent? The specialists of the design bureau were constantly diverted for work at canneries, they were frequently assigned the most unskilled operations. In recent times, it was noted at the meeting, we have been talking a lot about the prestige of engineering labor. However, we are doing extremely too little in this sense. Here is a typical example: electronic engineers can be adjusters of modern machine tools which are equipped with control electronics. But a machine tool operator, as a rule, does not have a higher education. Nevertheless he is assigned to the category of basic workers, while the engineer-adjuster, even after having gone through the job network, is assigned to the category of auxiliary workers. In other words, it is impossible to cover the costs in the waste of engineering personnel only by the good intentions to patch the gaps in internal mismanagement.

How the problem of stimulating the creative thinking of engineers and their participation in scientific research is being solved at a number of enterprises was shown on the basis of the example of the Combine of Artificial Leather and Industrial Rubber Items imeni M. I. Kalinin and the Beltsy Locomotive Depot. At the combine of artificial leather a method of organizing the competition of engineers in accordance with personal creative plans was developed for the first time in the country. This made it possible to direct engineering thought in the necessary course. Here they prepare annually a subject reference list on all the ripe problems of production. Personal creative plans, which are aimed at the elimination of bottlenecks, are also drawn up on its basis. The enterprise spends 2,000-2,500 rubles annually on the material stimulation of engineers, while the economic impact from the implementation of their plans comes to more than 700,000 rubles a year.

A similar system has also been introduced at the Beltsy Locomotive Depot. Today 180 engineers, process engineers and production innovators are working here in accordance with personal creative plans, this is giving production a large impact.

THE PILOT EXPERIMENTAL BASE AND RELIABLE SCIENTIFIC AND TECHNICAL INFORMATION ARE AN INDISPENSABLE CONDITION OF THE FUNCTIONING OF THE PLANT SECTOR OF SCIENCE.

Applied science is a very valuable, but "perishable" product. That is why the time from the development of a scientific idea at the enterprise to its implementation should be the shortest possible. What can ensure this? In the opinion of the participants in the round-table meeting, first of all a developed pilot experimental base of the enterprise, well-organized scientific and technical information and appraisal.

The establishment of research centers, which are in keeping with our times, is not envisaged, as a rule, in the plans of new enterprises. Central plant laboratories are furnished mainly with monitoring equipment and instruments. Meanwhile their potentials are very great. Perhaps, it was noted at the meeting, it is advisable to include the themes of some operations of central plant laboratories in the plans of the research work of sectorial scientific research institutes, having also changed in this connection the system of their financing. This will make it possible to increase the authority of central plant laboratories and, consequently, to increase their role in the acceleration of scientific and technical progress.

It is also important to be concerned, it was noted at the meeting, about the information supply of plant researchers. Owing to their specific status they often are as if outside basic information communications. Meanwhile it is important for plant researchers to know where a new thing and what that is new has been developed, but also how this was achieved, at what cost and what impact was obtained in this case.

It is also important to set up a system of the sectorial forecasting of scientific and technical progress. For this the Moldavian SSR Academy of Sciences, the Ministry of Higher and Secondary Specialized Education and the sectorial scientific research institutes should organize closer contacts with plant researchers and acquaint them with their developments. As for the appraisal of innovations, here the opinion was unanimous: it is necessary to simplify the process of coordination, to increase in this matter the role and responsibility of technical councils and to give more independence to the managers of enterprises.

No matter what aspects of the activity of the plant sector of science the speakers touched upon, they, nevertheless, invariably turned to the human factor. The concern about the level of creativity of plant engineers, designers, process engineers and worker-innovators requires constant, thoughtful and scrupulous educational work and the reform of the thinking of people in the direction of the new tasks, which were posed by the April (1985) CPSU Central Committee and in the report of General Secretary of the Central Committee of our party Comrade M. S. Gorbachev "A Fundamental Question of Party Economic Policy." Today the communists of the Plant of Calculating Machines imeni 50-letiya SSSR, as was related at the meeting, are acting in precisely such a key. The party committee of the plant is constantly keeping in its field of view the questions of the role of engineering and technical

personnel in the acceleration of technical progress. At the meetings of the party committee and the assemblies of the first party organizations the communists systematically hear about their creative search and personal contribution to the increase of the quality of the output being produced. On the initiative of the party members a comprehensive goal system of scientific and technical progress, in which the place of each engineer, designer and process engineer is defined precisely, is being introduced at the enterprises. A 3-year program of the retooling of the enterprise has been formulated and its implementation has begun. And here every specialist knows his role and imagines clearly the coefficient of his participation. Today the efforts of the primary party organizations are concentrated precisely on the ideological support of these most important tasks.

The participants in the round-table meeting made a number of suggestions, the implementation of which will make it possible to solve the most urgent problems of the activity of the plant sector of science. In their opinion, it is advisable to set up as a voluntary service a republic council for the promotion of scientific and technical progress; to simplify resolutely the system of the coordination of the developments of plant researchers; to set up in Kishinev a coordinating center for computer-aided design systems, which would eliminate duplication and would ensure the rapid introduction of developments; to expand graduate studies in the interests of the plant sector of science at the Moldavian SSR Academy of Sciences and the Ministry of Higher and Secondary Specialized Education.

All this, in the opinion of the round-table participants, will make it possible to involve in active creative scientific and technical work a large detachment of specialists of enterprises and will have a beneficial effect on the rate of scientific and technical progress.

B. Belenkiy and L. Popelkova prepared the materials of the round table.

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ORGANIZATION, PLANNING AND COORDINATION

PEOPLE'S CONTROL CHECKS REVEAL LENINGRAD OBLAST SHORTCOMINGS

Moscow SOVETSKAYA ROSSIYA in Russian 10 Jul 85 p 3

[Article by Chairman of the Leningrad Oblast Committee of People's Control V. Meleshchenko: "The Assignment for Tomorrow"]

[Text] Every tenth worker of the country of those employed in the sphere of science works at one of the 300 Leningrad scientific, planning and technological organizations. Academicians and corresponding members, doctors and candidates of sciences, engineers and technicians by their developments are significantly determining the intensification of production not only in the city and oblast, but also throughout the country. Here at a meeting with the party aktiv of Leningrad Mikhail Sergeyevich Gorbachev gave a high rating to Leningrad science and stressed that "the indicators of many ships, projects of power engineering, ferrous and nonferrous metallurgy, chemical and petrochemical complexes, which are being built in the country, depend on the level of the plans which are being drafting by institutes and design bureaus." But serious complaints were also lodged against a large number of scientific research institutes, scientific production associations and design bureaus--in the reliability of operation, the material intensiveness, the degree of automation and other parameters a large number of items are not up to the advanced level, or else do not suit consumers at all. And this is also so.

The efficiency of many scientific and planning organizations at times is still far from the demands which are being made today. Why? The reasons are diverse. For example, at the All-Union Scientific Research, Planning and Design Institute of the Mechanical Processing of Minerals of the USSR Ministry of Nonferrous Metallurgy there is not even a long-range plan of operations. In fact all the research is performed here without technical assignments and without consultations with the client. But the level of developments is such that at the enterprises, which were built in accordance with the plans of this institute, labor productivity is significantly lower than the available analogues. The duration of the "research-introduction" cycle here is dragging on for 7-9 years.

This, unfortunately, is not the only example. Last year we checked the activity of one scientific research, planning and design and technological organization out of every three. They treated very attentively the decisions and recommendations adopted by the committee, and the follow-up checks, I will

say frankly, pleased us. At 28 organizations the economic efficiency from the acceleration of the introduction of developments increased by 16.5 million rubles, at 38 the output per staff member increased. Nearly 350 people were cut from the staff of 92 organizations. At 17 institutes the time for 136 developments was shortened. More than 300 nonurgent themes were eliminated from the thematic plans.

To what do these figures testify? Far from all economic and scientific managers were able to specify clearly the main directions of technical policy in their sectors and at their enterprises. Many themes of developments do not contain fundamental novelty and fresh technical ideas.

Not that long ago the City Committee of People's Control checked the work of the sectorial planning institute Rospishchepromavtomatika [expansion unknown]. It is difficult to say what assistance this organization gave to the RSFSR Ministry of the Food Industry. Most likely none. The specialization and peculiarities of production were not taken into account in the long-range plan of the work of the institute. And this plan consists of uncoordinated themes, their elaboration and introduction was unjustifiably delayed for 5-8 years, and therefore this institute in fact is not taking part in the retooling of the sector and is not fulfilling the assignments of the ministry on the decrease of manual labor. The RSFSR Ministry of the Food Industry reacted promptly to the representation of the Committee of People's Control and took effective steps on the strengthening of the management of the institute. It is merely incomprehensible why it was necessary to wait for the intervention of the people's control members.

The quality of checks and their great practical result are achieved on a mandatory condition: careful preparation and reliable procedural support. The already well-known experience of the scouts of the All-Union Scientific Research Institute of Electric Welding Equipment (VNIIESO), which was approved by the USSR Committee of People's Control, is greatly helping us here. We have recommended to the people's control groups of all institutes to analyze and study it, to adopt it. Today it is already being used extensively in the practical work of all scientific collectives.

In recent times checks of the fulfillment of the assignments of the state and regional scientific and technical comprehensive goal programs have become mandatory in control work. We checked one of them--"The Automation of the Control of Technological Progresses, Works and Equipment With the Use of Minicomputers and Microcomputers"--at seven scientific and planning organizations. Three of them are the main ones, it is they that also allowed serious shortcomings. The assets, which were allocated for the development of automated systems for the control of technological processes, are being used inefficiently, coordination of operations has not been ensured, there is no comprehensiveness in the solution of problems, the quality of planning work is low.

We have the following practice--we turn with the results of the checks to superior departments and organizations and pose specific questions of the development and activity of the scientific institutions subordinate to them. I would not recall a case when someone ignored our representations. Such was

also the case this time. The steps taken by the departments are ensuring today the complete fulfillment of the program of automated systems for the control of technological processes. After a while we intend to return to this question and--in case everything is in full order--will remove it from control: it is not enough to achieve simply the elimination of identified shortcomings, it is also necessary to have an influence on the subsequent course of the improvement of the activity of scientific collectives.

The achievement of an average annual growth rate of labor productivity of up to 4 percent and in machine building up to 5 percent should be the ultimate result of the Intensification-90 Regional Sectorial Program, which is now being implemented in the oblast. If we go into all the questions of its implementation, and precisely such a task faces us, NTP [scientific and technical progress] will be not only a customary abbreviation, but also a practicable matter.

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ORGANIZATION, PLANNING AND COORDINATION

LEGAL ASPECTS OF DEVELOPMENT OF NEW EQUIPMENT

Moscow KHOZYAYSTVO I PRAVO in Russian No 5, May 85 pp 68-70

[Article by Doctor of Juridical Sciences A. Podoprigora: "Scientific and Technical Progress: Several Questions of Legal Regulation"]

[Text] The present conditions of the development of the national economy are making more and more urgent the acceleration of scientific and technical progress. The basis of the substantial increase of labor productivity today is the assurance by industry of the output of products which conform in their indicators of the best modern examples, as well as the introduction of advanced technological processes.

The decree of the CPSU Central Committee and the USSR Council of Ministers of 18 August 1983, "On Measures on the Acceleration of Scientific and Technical Progress in the National Economy,"[1] made a number of fundamental additions to the organization of operations on the development, assimilation and introduction of new equipment, which are aimed at the acceleration of scientific and technical progress. In particular, it was deemed necessary to carry out during 1985-1987 the changeover of associations, enterprises and organizations of agriculture, construction, transportation, communications, geology and material and technical supply to the cost accounting system of the organization of operations on the development, assimilation and introduction of new equipment. Thus, the unified cost accounting system of the organization of operations on new equipment will be in effect in all the sectors of the national economy.

Now for the purpose of increasing the role of the consumers of products in the drafting of plans of the development and production of new equipment the USSR ministries and departments, which are the main ones with respect to the types of products, should elaborate and approve in consultation with the ministries, which are the basic consumers of the corresponding products, promising ranges and systems of machines, equipment and other machinery. At the same time the ministries and departments, which are the main ones with respect to the types of products of machine building, are obliged to elaborate jointly with the client ministries differentiated standards of the time of their updating (modernization).

The norm, which establishes the material liability of consumers for the rejection of equipment, which was produced in accordance with their orders, or a lengthy period of its placement into operation, is of great importance.

The Procedure of the Certification of Industrial Products According to Two Quality Categories was approved by the decree of the State Committee for Standards, the State Committee for Science and Technology, the USSR State Planning Committee and the State Committee for Prices of 17 February 1984.[2] Items, which have not been certified in accordance with these categories, are liable to removal from production. However, the State Planning Committee has been granted the right to permit (as an exception) their production for not more than 2 years. Products, which in their technical and economic indicators are at the level of world achievements or exceed them, should be assigned to the highest quality category. Products, which conform to the standard technical documents, in accordance with which they are produced and which contain modern requirements which correspond to the values envisaged by the standards for series-produced products, should be assigned to the first quality category.

The Statute on the Procedure of the Creation and Use by the USSR State Committee for Science and Technology of a Reserve of Assets for the Performance of Work on All-Union Scientific and Technical Programs by Means of Deductions From the Unified Funds for the Development of Science and Technology of USSR Ministries and Departments was approved by the decree of the State Committee for Science and Technology, the USSR State Planning Committee and the USSR Ministry of Finance of 8 February 1984.[3] The indicated reserve is formed by means of annual deductions from the unified funds for the development of science and technology of USSR ministries and departments in the amount of 1.5 percent of the portion of these funds, which is spent on the assimilation and introduction of new equipment and is envisaged in the financial plans (the accounting balances of income and expenditures) of USSR ministries and departments.

The implementation of measures, which are aimed at the acceleration of scientific and technical progress, requires the solution of a number of legal problems and the improvement of the legal regulation of the social relations which form in the process of developing and using new equipment and scientific achievements. Among them practice is putting in first place the definition of THE CONCEPT OF NEW EQUIPMENT [in boldface]. At present both fundamentally new scientific and technical developments and developments, which negligibly improve the equipment being used and do not make a substantial contribution to the acceleration of scientific and technical progress, are being grouped with new equipment.

The basic technical, economic and social requirements, which new equipment and other products of machine building should satisfy, have been formulated in directive documents and enforceable enactments. These are first of all great efficiency, reliability and durability. New equipment should be energy- and material-saving and be of a great unit power (wherever this is required), should have patent cleanness and competitive ability and should save material, manpower and raw material resources. Moreover, like all products of machine

building, it should satisfy the requirements of a high technical level and industrial design.

However, with respect to the definition of the concept of new equipment, as well as its technical level there is no common opinion in legal literature. The Method (Basic Principles) of the Determination of the Economic Efficiency of the Use in the National Economy of New Equipment, Inventions and Efficiency Proposals[4] contains a definition of this concept, but it has a strictly special purpose and is intended mainly for calculations of economic efficiency.

In legislation and legal literature it is possible to encounter such criteria of the evaluation of new equipment and technology as "fundamentally new," "new highly efficient," "not inferior to the highest world level" or "the level of the best domestic and foreign examples," "is of priority importance" and so on.

At the same time, in accordance with the statute, bonuses in excess of the established maximum amounts are paid for the development and introduction of new equipment, advanced technology and materials, which conform to the present technical and economic level or exceed it. The demands on the technical and economic indicators of machines, equipment, instruments, raw materials, materials and components should exceed the achieved level and conform to the long-range world level of equipment and technology. Moreover, a list of types of products of machine building, which are of the greatest national economic importance, is cited in the decree.

Is it possible to regard these differences in terminology as independent attributes of individual types of equipment of a different level? It seems that there are no grounds for such a conclusion. Of the cited definitions of the technical level of new equipment two, in our opinion, are basic: "the products of machine building, which in their technical and economic indicators surpass the achieved level and conform to the long-range world level of equipment and technology."

Thus, such a criterion as superiority over the known world level of equipment and technology is of fundamental importance for the determination of the legal attributes of new equipment and first of all its technical level. This attribute predetermines the importance of the object of new equipment for the national economy. At the same time the equipment being developed and introduced should be fundamentally new and be based on highly effective inventions.

The legal regime of the planning, financing and economic stimulation of the development, assimilation and introduction of new equipment requires constant improvement.

In our opinion, in development of the statute it is advisable to draft and adopt the corresponding enforceable enactment, which would envisage a favorable legal regime of the organization of operations on the development, assimilation and introduction of the items which are included in the list of

types of products of machine building, which are of the greatest national economic importance.

The decree, in particular, establishes the material liability of the consumer for the rejection of the equipment, which was developed in accordance with his order, or a lengthy period of its placement into operation. However, it is not specified, specifically what responsibility the client bears in these cases. Meanwhile the client at times is not concerned about the technical level of the equipment being ordered, since he can easily withdraw his order. Here he is not responsible either for the qualitative evaluation of the order or for the quantitative order. The practice of the Kiyevtorgmash Production Association, for example, attests that the client can arbitrarily decrease the amount of ordered equipment and can reject it on the grounds that it does not satisfy current requirements. Such a one-sided rejection is made easier by the fact that developing ministry bears the costs for the development, assimilation and introduction of the new product at the expense of its own unified fund for the development of science and technology.

In our opinion, it is necessary to specify the responsibility of the client ministry in those instances when the indicators of the ordered equipment (in accordance with the technical assignment) are lower than the level of the best current examples. If such equipment not only has been developed, but has also been introduced in production, the responsibility should be increased.

According to the data of statistical reporting, in a number of ministries the proportion of the assimilation in production of developments, which are based on highly effective inventions, is still negligible. As a whole for the country this indicator in 1983 came to 40 percent.5 This attests to the insufficiently high level of equipment and technology, as well as the products being produced. The underestimation of the technical level of the equipment being developed and assimilated leads to an imaginary saving, which in the end turns into large losses for the state.

Specifically what responsibility and to whom should the consumer bear for the rejection of equipment, which was developed in accordance with his order, or a lengthy period of its placement into operation? It seems that this will be a fine in the amount of a specific percent of the sum of the ordered equipment, which will increase subject to the time of its placement into operation. In case of the complete rejection of the developed equipment the consumer, of course, should reimburse the developer for all the expenses and losses, which are connected with development and production. The fine for a lengthy period of the placement of the equipment into operation and the amounts, which were obtained from the sale of the equipment which the client rejected, should be transferred not to the developer and producer, but to the reserve of assets of the State Committee for Science and Technology, which is formed in conformity with the statute.

These assets should be allocated for the financing of the development and assimilation of new equipment of sectorial or national economic importance. The transfer of the fines and the amounts from the sale of the equipment, which the client rejected, in favor of the developer or producer of the new equipment would be at variance with the principles of cost accounting and

would be unfounded enrichment. It seems that it would be advisable to transfer the wholesale price reductions in the amount of up to 30 percent, which the USSR State Committee for Prices has the right to establish for industrial products liable to removal from production, to the indicated reserve of assets of the State Committee for Science and Technology and to allocate them for the same purposes.

In our opinion, the duty assigned to the State Committee for Science and Technology to carry out starting in 1986 the state checking of the activity of sectorial scientific research, design, planning, planning and design and technological organizations is of great importance for the assurance of a high technical level of new equipment. Its main goal is to eliminate the possibility of inefficient scientific and technical developments getting into production.

An important role in the decree is assigned to the coordination of the plans on new equipment with the production plans. The assignments on the development of science and technology have been included among the most important indicators, in accordance with which the evaluation of the results of economic activity is made and the results of the socialist competition are also summarized. The further dissemination of goal program planning and the establishment of one-time bonuses for new equipment in excess of the established amounts will be of no less great importance for the stimulation of work.

The now prevailing organization of the planning of the cost accounting system of operations on the development, assimilation and introduction of new equipment envisages the separate, independent planning of new equipment and production activity. Therefore, prior to the adoption of the decree the nonfulfillment of the plans on new equipment did not influence the overall results of economic activity and, of course, its stimulation. The planning of operations on new equipment should become a part of the planning of production activity, while the scientific and technical achievements, which are being developed, introduced and used, should become a means of the fulfillment of the production assignments. In case of such a method of planning the interconnection of scientific and technical work and production activity will be achieved.

Under these conditions economic stimulation for the overall results of economic activity will be closely connected with the use of the achievements of science and technology in production. In this future this dictates the need for the establishment of the unified legal organization of economic stimulation for the overall results of economic activity and the development and introduction of new equipment.

FOOTNOTES

1. Hereinafter the decree.

2. See BYULLETEN NORMATIVNYKH AKTOV MINISTERSTV I VEDOMSTV SSSR, No 8, 1984, pp 3-13.

3. Ibid., pp 14-15.

4. See VOPROSY IZOBRETATELSTVA, No 7, 1977, pp 46-65.

5. See I. S. Nayashkov, "The Development of Invention to the Level of the Present Tasks," VOPROSY IZOBRETATELSTVA, No 9, 1984, p 6.

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ORGANIZATION, PLANNING AND COORDINATION

ECONOMIC RESEARCH PLANNING AT REPUBLIC ACADEMIC INSTITUTES

Kiev EKONOMIKA SOVETSKOY UKRAINY in Russian No 5, May 85 pp 69-73

[Article by Candidate of Economic Sciences T. Reshetova: "Procedural Aspects of the Improvement of the Planning of Economic Scientific Research"]

[Text] The gradual intensification of social production is posing the need in the 1980's to use more completely the most abundant possibilities and advantages of the economy of mature socialism. Economic science is called upon to play an important and significant role in the accomplishment of this task. The objective importance of economic science is confirmed by the evaluation which scientists, who are representatives of other sciences, give to it. "Economic science today is one of the central fields of knowledge" (Academician G. I. Marchuk). "Not one science can compete with economic science in the degree of influence on the development of other basic sciences" (Academician A. A. Trofimchuk).[1]

Like any scientific process, the process of the performance of economic scientific research occurs in time and space. The planning of the cycle from the start of research to the introduction of the results in the practice of economic management in the system of economic research is carried out in the same way as for any scientific process--with respect to each direction, problem, set of themes, theme, job and so on.

The principle of the goal program orientation of the system of planning of the socialist economy also predetermines the goal orientation of the planning of its individual subsystems, including the planning of economic scientific research.

The goal of the management of economic scientific research--the coordination of the efforts of all the sections and units of social production on the assurance of the efficient use of manpower, material and information resources and the achievement of the highest indicators of the efficiency of social production--also follows from the objective basic goal of socialist social production (the meeting of the increasing needs of the working people). The following tasks of management follow from the goal of the management of economic scientific research: the perception of the objective economic laws, the mechanism of the interaction and the revelation on this basis of the trends of the movement of production relations, of which the development of

productive forces is the basis; the consolidation and specification of the coordinating plans of economic research and the determination of the most valuable scientific developments for their recommendation for introduction in the national economy; the promotion of the extension of the practice of the formation of scientific research operations of an applied nature on the basis of the laws on the part of the corresponding state, planning and economic organs; the consideration of the questions of the training and the increase of the skills of scientists; the supervision of the work of scientific councils, scientific societies, commissions and editorial boards of journals attached to the Ukrainian SSR Academy of Sciences of the economic type; the strengthening of creative contacts and cooperation with the leading scientific research institutions of the USSR Academy of Sciences and the academies of sciences of the union republics.

The assurance of the most efficient organization of the scientific research process and the assurance of the efficient use of the scientific potential and the achievement of high resultant indicators of scientific products (the theoretical level, the novelty of research and its practical value) are the goal of the management of economic scientific research at the scientific research institution.

Any stage of organizational and management activity begins with planning as the basis of management. The process of planning economic scientific research is realized at various levels: the planning of economic science on the scale of the country and with a breakdown by sectors and socioeconomic programs; the planning of individual themes of scientific research work; the planning of the activity of individual scientific research organizations; the planning of the work of subdivisions and performers.

The planning of scientific research work at the Ukrainian SSR Academy of Sciences is carried out in accordance with "Metodicheskiye ukazaniya po planirovaniyu nauchno-issledovatelskikh rabot v Akademii nauk Ukrainskoy SSR" [Procedural Instructions on the Planning of Scientific Research Work at the Ukrainian SSR Academy of Sciences] ("Naukova dumka", 1973).

The diversity and complexity of the tasks, which face research economists today, the broadening and extension of the comprehensiveness of the scientific, technical and socioeconomic problems being solved and the complication of coordination ties predetermine the use at the economic institutes of the Academy of Sciences of various types of planning. As the analysis showed, in the practical activity of the economic institutes it is possible to distinguish the following types of directions, which are encompassed by planning:

1. By content: problem planning (the drafting of the plan of research on the most important economic problems of the comprehensive program of scientific and technical progress for 20 years); program planning (the formulation of programs of research on the most important basic problems, by socioeconomic comprehensive goal programs); thematic planning (the drafting of plans of research by themes); procedural planning (the formation of the program of research, the procedural support of the conducting and the organization of the process of research with a breakdown by individual stages); socioeconomic

planning (the drafting of the plan of the social development of the collective); scientific organizational planning (the drafting of the plan of work of the Scientific Council of the institute, specialized councils for defense, meetings of the board of directors and the aktiv).

2. In the address (spatial) context: structural planning (the drafting of plans of departments, sectors, laboratories and problem groups); process planning (the planning of operations by individual stages and performers); consolidated planning for the institute; coordination planning (the planning of the coordination of activity with external coperformers); scientific information planning (the planning of the receipt of scientific information from information centers--the USSR Central Statistical Administration, the Ukrainian SSR Central Statistical Administration).

In the temporal aspect the practice of planning economic research distinguishes the long-range (long-term), five-year, annual and calendar types of planning.

The plans of economic scientific research are detailed, scientifically substantiated programs, which have been compiled in conformity with the assignments which have been approved within the state plan of the development of science and technology, assignments of superior organizations and suggestions of the structural subdivisions of the institute.

The long-range planning of economic research is of a consolidated nature, the determination of the directions of scientific research and the possibilities of using scientific results in national economic practice is its goal. Here the temporal aspect of planning is closely interconnected with its direction by content. Long-range planning in this case is identified with problem and program planning. Important scientific directions, which characterize the scientific type of the institution, the problems and sets of themes, are the object of long-range (problem) planning. Long-range (problem) planning contributes to the assurance of continuity in economic scientific research and to the concentration of skilled personnel on the main directions of the research process.

The long-range (problem) planning of economic research at the institutes of the Academy of Sciences is carried out in the following manner. The economic departments and scientific councils for problems jointly with the Presidium of the USSR Academy of Sciences and the USSR State Committee for Science and Technology draw up lists of the problems, which should be solved during the long-range period and on which research programs should be compiled. The long-range (problem) planning at the economics institute of the Academy of Sciences is carried out in the process of formulating the Program of Research on the Most Important Basic Problems (for a period of 15-20 years).

In recent years the elaboration of suggestions on the Comprehensive Program of Scientific and Technical Progress and Its Socioeconomic Consequences for 20 Years With Its Specification Every 5 Years was an important decisive unit in the system of long-range planning. The economics institutes of the academy of sciences of the union republics are also carrying out the formulation of such programs for the republics. The comprehensive program of scientific and

technical progress acts as a system of preplanning research and the formulation of comprehensive goal programs and serves as the basis for the formulation of the five-year plans of the economic and social development of republics and regions.

The five-year plan is the basis of the present system of the planning of the development of science and technology. The five-year plan at the economics institution of the Academy of Sciences is drafted with allowance made for the assignments, which are envisaged by the decisions of the party and government, the decrees of the Presidium of the USSR Academy of Sciences and the presidiums of the academies of sciences of the union republics, the USSR State Planning Committee, the state planning committees of the union republics and the USSR State Committee for Science and Technology, the Comprehensive Program of Scientific and Technical Progress and Its Socioeconomic Consequences for 20 Years and the socioeconomic comprehensive goal programs, which are approved by the Presidium of the USSR Academy of Sciences and the presidiums of the academies of sciences of the union republics.

The drafting of the five-year plan begins with the elaboration by the structural subdivisions of the institute of the basic directions of research for the coming 5-year period. On the basis of the basic directions the departments and sectors of the institute prepare suggestions on the draft of the five-year plan, having gotten agreement on them in advance with the coperformers (the Institute of Economics of the USSR Academy of Sciences, the institutes of economics of the academies of sciences of the union republics, regional affiliates, sectorial scientific research institutes and chairs of higher educational institutions).

The draft of the plan, which was prepared by the economics institute of the republic Academy of Sciences and was approved and endorsed by the Scientific Council, is included by the Economics Department in the republic draft of the five-year plan, which was drawn up with allowance made for the drafts of the plans of the republic institutes of the economic type, the state planning committees and the ministries of higher and secondary specialized education, as well as scientific research institutions, ministries and departments of the republic and the USSR.

The Institute of Economics of the Ukrainian SSR Academy of Sciences (for questions of Marxist-Leninist economic theory, the basic problems of the economics of mature socialist society); the Scientific Research Economics Institute of the Ukrainian SSR State Planning Committee (for problems of national economic planning and management, scientific and technical progress and the effectiveness of capital investments in the national economy); the Council for the Study of the Productive Forces of the Ukrainian SSR of the Ukrainian SSR Academy of Sciences (for problems of the development and complete use of natural and manpower resources); the Institute of Industrial Economics of the Ukrainian SSR Academy of Sciences (for problems of economic cybernetics, the development of automated systems for the collection of information for accounting, planning and the management of the national economy of the republic); the Ukrainian Scientific Research Institute of the Economics and Organization of Agriculture imeni A. G. Shlikhter of the Southern Department of the All-Union Academy of Agricultural Sciences imeni

V. I. Lenin (for economic problems of agriculture and questions of the development of the operation of agroindustrial associations); and the Ukrainian Scientific Research Institute of Trade and Public Dining of the USSR Ministry of Trade (for problems of the economics and organization of trade, public dining and consumer cooperatives, economic legal questions of the sphere of exchange) draw up the draft of the republic plan on the most important economic problems for the Ukrainian SSR on the basis of the suggestions of the main ministries, which carry out the coordination of research in the republic on the corresponding problems, and are responsible for their solution.

The draft of the republic plan is considered and approved by the republic State Planning Committee, the Economics Department of the Academy of Sciences, the main institutions of the economic type of the republic, the scientific councils for problems, as well as the Republic Council for the Coordination of Scientific Research in the Natural and Social Sciences.

The republic five-year plan of scientific research is drafted on the most important economic problems in conformity with the structure of the draft of the union Plan of Scientific Research Work on the Natural and Social Sciences (Volume 5 "The Most Important Economic Problems"). All the problems of scientific research work in the republic plan are grouped by sections, basic scientific directions and problems, which were formulated in the union plan.

The drafts of the five-year plans, which have been drawn up with a breakdown by individual republics, are used when drawing up the consolidated draft of the union coordinating Plan of Scientific Research on the Natural and Social Sciences--Volume 5 "The Most Important Economic Problems," which is approved by the USSR Academy of Sciences in consultation with the USSR State Committee for Science and Technology and the USSR State Planning Committee.

The section "The Most Important Economic Problems" of the Plan of Scientific Research on the Natural and Social Sciences consists of three parts, which specify in consolidated form the most important directions of research of economic science during the 5-year period being planned, namely:

Part I. The Economic and Social Problems of Mature Socialism and the Laws of Its Development Into Communism.

Part II. The Theory and Methodology of the Planning and Management of the Socialist Economy.

Part III. The Problems of the Development of the World Economy.

Each direction contains a list of the problems, subproblems and themes, on which the conducting of economic research is envisaged during the period being planned. It is necessary to note that the plan in the form in which it exists today has an essential shortcoming. It is not clearly specified in it what relates to the problem, the theme and the scientific direction.

Like every structure which unites in itself a series of successive elements from the lowest to the highest or vice versa, the structure of the plan should

conform to the general laws of its construction, that is, each successive element should be a component of the preceding one and be coordinated with respect to the following one. In our section of the plan the "part," which acts as "the most important direction" which is broken down into component elements--"the basic scientific problems, themes"--is the most important one in the hierarchy of elements. Then "the scientific problems," in turn, are broken down again into directions. Such an identity in terms leads to a breach of logic and creates confusion. The terminology of the structural components of the plan for the section "The Most Important Economic Problems" should be formed so that the term would correspond to the line item of the plan and would give a clear idea about which one of them it is a question of. That is, if we are speaking about a direction, hence we are presenting a part of the plan (I, II, III). If it is a question of a scientific problem, it is immediately possible to imagine that the sections of the above-indicated parts are meant. But in the context of scientific problems the comprehensive goal programs, the comprehensive themes and the sections of the themes, which in the plan should be placed in column 2, should already act as the line items of the plan. Therefore column 2 should be called not "The Basic Directions, Problems and Themes," but "The Name of the Comprehensive Programs and Assignments, Comprehensive Themes and Sections of Themes." Clear terminology, which reflects the hierarchical structure of the plan, will directly affect the coding of the line items of the plan and will eliminate the difficulties which occur today when inserting a theme in the plan and determining its code. The shortcomings of the unclear terminology of the line items of the section "The Most Important Economic Problems" appear especially vividly in case of the preparation of reporting and the observance of the instructional statutes on the conformity of the structure of the reports of the scientific institution to the report of the corresponding leading institution (for example, the reports of the institutes of economics of the republic academies of sciences and the Institute of Economics of the USSR Academy of Sciences). In practice at different institutions differences with respect to the entering of one theme or another in the corresponding section of the plan also frequently occur.

The demands on the improvement of the structure of the plan and the specification of terminology are also dictated by the need for the introduction of assignments on the formulation of comprehensive goal programs in the structure of the plan.

In the system of 5-year planning, moreover, in our opinion, there is another essential shortcoming, which to a significant degree complicates the coordination of the activity of the coperformers of the important comprehensive themes which are included in the state plan of scientific research on the natural and social sciences. Thus, at the Institute of Economics of the USSR Academy of Sciences the time of the fulfillment of themes is coordinated with the principle of 5-year planning. The length of the period, during which research is conducted on the theme, comes to 5 years, at times it is broken down into two independent stages with times of fulfillment of 3 and 2 years or 2.5 years each.

In the system of economic institutes of the academies of sciences of the union republics, particularly at the Ukrainian SSR Academy of Sciences, a period of

the duration of research on a theme of not more than 3 years has been established. Such a situation upsets the continuity in the performance of research with a breakdown by comprehensive themes and complicates the coordination of the efforts of the coperforming institutes both with the main institute for important economic problems (the Institute of Economics of the USSR Academy of Sciences) and with the institutes of the academies of sciences of the other union republics. This, in turn, leads to the violation of the comprehensiveness of the problems being solved and to repetition and work on minor themes in economic research.

For the elimination of the indicated phenomena, in our opinion, it is necessary to bring the thematic planning of economic scientific research in line with the principle of 5-year planning and to plan comprehensive themes with a time of fulfillment of 5 years. Here it is possible to provide for the breakdown of a theme into subthemes with a total time of fulfillment of 5 years.

The republic five-year plans of scientific research on the most important economic problems serve as the basis for the drafting of republic annual plans, which are drawn up by the economics departments of the academies of sciences of the union republics with the participation of ministries and departments and are approved by the Presidium of the Academy of Sciences of the union republic in consultation with the republic State Planning Committee and the Republic Council for the Coordination of Scientific Research Work on the Natural and Social Sciences.

The drafting of the annual plan of economic scientific research is the basis of annual planning at the economics institute of the Academy of Sciences. It is drafted on the basis of the approved five-year plans and assignments, which are envisaged in the coordinating plan for the section of the most important economic problems, the Comprehensive Program of Scientific and Technical Progress and Its Socioeconomic Consequences and the socioeconomic comprehensive goal programs, which are approved by the Presidium of the USSR Academy of Sciences and the presidiums of the academies of sciences of the union republics.

The process of drafting the annual plans of economic research begins with the orders of the Presidium of the USSR Academy of Sciences and the presidiums of the academies of sciences of the union republics, in which the procedure and time of the drafting of the plans are specified.

The annual plan of scientific research of the institute, which has been approved by the Economics Department, is the basis of the drafting of the annual plans of research of the structural subdivisions.

The drafting of the annual plan on new themes begins with the establishment of the time of the formulation of the procedural program of research, which provides the procedural aspect of the process of fulfilling the planned theme, as well as its scientific organizational basis. In this case annual planning corresponds in content to the procedural and scientific organizational type of planning. Moreover, annual planning at the same time is address planning, since the drafting of annual plans of the performance of research on planned

themes is carried out with a breakdown by structural subdivisions (departments, sectors, laboratories and others) with respect to the individual sections and stages by the performers and coperformers (internal and external), as well as with a breakdown by the plans of the scientific information support of the research process.

The sections and stages of themes, which are included in the thematic plan of the institute and which it is necessary to fulfill during the year being planned, are encompassed by annual planning. Among the objects of planning, which are covered by the annual plan, there are: new themes (which are being included for the first time in the thematic plan during the year being planned); carryover themes (which were included in the plan in years which precede the year being planned); themes being completed (the time of the completion of the elaboration of the theme is the year being planned).

The annual plan of economic scientific research, thus, is a thematic plan, since it encompasses all types of themes which are being fulfilled during the year being planned. The annual planning of economic scientific research for each type of theme is carried out in the process of drafting the working plans for the year being planned and for each type of theme (new, carryover, being completed) has its own peculiarities, which are connected with the breakdown of the scientific process of research by stages.

The process planning of economic research as a component of annual planning includes: the plan assignments for the next quarter; the coordination and linking of the assignments of the current quarter; the monitoring of the progress of the fulfillment of the assignments of the quarterly plan and operational control; the summarization of the results on the fulfillment of the quarterly assignments and the submitting of the corresponding information to the Economics Department (the report for the quarter). The basic reserves of the improvement of the planning and organization of economic research are concentrated in the system of annual and process planning, directly where the process of scientific research occurs. A knowledge of the laws of the realization of the process of creative scientific work in economic research is one of the main tasks of planning at all levels.

The task of improving the planning of economic scientific research is closely connected with the solution of a number of procedural problems: the identification of the essence of economic research as a scientific process; the elaboration of the basic principles of the classification of economic research; the determination of the basic stages and phases of the process of economic scientific research; the identification of the basic types and forms of the final product; the development of evaluation indicators of the results of economic scientific research; the organization of the process of scientific research, the recording and checking of its results. Studies of the listed problems are being conducted at the Institute of Economics of the Ukrainian SSR Academy of Sciences in the Department of Methodological Problems of the Integration of Science With Production.

FOOTNOTE

1. EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA, No 2, 1974.

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ORGANIZATION, PLANNING AND COORDINATION

UKRAINIAN EXPERIENCE IN INTEGRATING SCIENCE WITH PRODUCTION

Kiev EKONOMIKA SOVETSKOY UKRAINY in Russian No 5, May 85 pp 63-69

[Article by Candidate of Economic Sciences V. Marushchak: "The Forms and Experience of the Strengthening of the Contact of Science With Production"]

[Text] Among the large number of important and difficult problems of the management of the scientific and technical potential an important place is being assigned to the intensification of the organizational forms of its use. Thus, in conformity with the changed conditions of the functioning of science in the republic, which were dictated by the changeover from the extensive to the primarily intensive means of its development, six scientific centers (NTs's) of the Ukrainian SSR Academy of Sciences: the Donetsk, Pridneprovskiy, Western, Southern, Northeastern and Northwestern, were established for the increase of the efficiency of scientific research development. These centers are an effective form of intersectorial coordination, which promotes the more complete use of the scientific potential of regions, the concentration of the efforts of collectives, organizations and enterprises of the region on the solution of the most urgent problems and the strengthening of the material base of scientific research. The activity of the scientific centers is contributing to the active and rapid introduction of the recommendations and developments of scientists in practice.

The scientific centers have assumed the task of the precise and efficient coordination of the efforts of academic institutes, the more reliable monitoring of the fulfillment of thematic plans and the provision of the necessary assistance to collectives. In addition to the already established contacts relations with sectorial institutes and the higher school are maintained through them. With the organization of the scientific centers additional opportunities appeared to distribute better the resources, which are being released for the development of the material and technical base of institutes, and to use more efficiently on the basis of cooperation computer technology and unique laboratory equipment. The establishment in the oblasts, where centers are not located, of scientific coordinating councils, which operate under the supervision of the scientific centers of the republic Academy of Sciences and the oblast party committees, is contributing to this.

The formulation and fulfillment jointly with enterprises and organizations of the regions of comprehensive plans of operations for the current five-year

plan in conformity with contracts on scientific and technical cooperation have become essential in the practical work of the scientific centers. In all 68 institutions of the academy, 70 higher educational institutions and about 130 sectorial institutions have been enlisted in their fulfillment. Research is being performed for more than 300 enterprises of the country.[1]

The establishment of interdepartmental associations, which include academic institutes, sectorial scientific research institutes, higher educational institutions, industrial enterprises and construction organizations, has contributed to the comprehensive solution of arising national economic problems. Such associations are already operating at the Western Scientific Center. They are playing a progressive role in the matter of the formation of production on a scientific basis. In particular, back during the 10th Five-Year Plan the Ekran Interdepartmental Special-Purpose Association was established for ensuring the fulfillment of the program "The Quality of Electron Beam Instruments." It included 10 scientific research institutes, higher educational institutions, planning and design and production organizations. The Institute of Applied Problems of Mechanics and Mathematics of the Ukrainian SSR Academy of Sciences (for scientific research work), the engineering, technical and design subdivisions of the Kineskop Production Association (for research and design development) and the main enterprise of the Kineskop Production Association (for introduction) were specified as the main organizations. Such associations help to overcome the departmental barriers, which are connected with the sectorial principle of the management of industry, and to make basic scientific developments accessible to practice.

As is known, the presently existing forms of the organization of scientific development at sectorial scientific research institutes and the assimilation of its results in production do not envisage the necessary continuous contact between the researcher, the developer and production. The entire process reduces to the following: sectorial scientific research institutes turn their suggestions over to design and planning institutions, then there are included in the development technological organizations and, at the final stage, production organizations (industrial, construction and others), which have to exert considerable more efforts in order to assimilate new items in production.

According to the existing arrangement of the scientific research institutes of the sectors of industry design bureaus, planning organizations and enterprises are independent units. They are separated by administrative boundaries, while their personnel to a certain degree are isolated from each other. Considerable difficulties arise in case of the coordination of the positions of researchers, designers, planners and process engineers and in case of the determination of their reciprocal demands, especially if questions for the researcher arise for designers and planners at the moment when the research has already been completed. Frequently the researcher is forced to return again to the initial experiments and to change his recommendations, since the new data could not be envisaged earlier. Design decisions also frequently evoke just reproaches, since, having been made without the participation of process engineers, they do not have the proper technological feasibility.

In current practice the unified process of the scientific and technical improvement of production proves to be disconnected, while the interrelations of researchers, designers, process engineers and production workers are organized not on the basis of joint collective labor, but on the basis of the principles of the "delivery-acceptance" of jobs by autonomous organizations. The natural result of such a situation is a considerable loss of time and the lengthening of the period of the assimilation of new equipment, as well as the unquestionable decrease of its qualitative level. According to the data of a number of surveys, at times as much time is spent on consultations alone as on the entire scientific elaboration of one problem or another.

Under the conditions of goal program management the overcoming of various kinds of "departmental barriers" (organizational, information, economic and others) is one of the basic tasks. At the beginning of the 1st Five-Year Plan there were 60 departments in the country, while at the end of the 10th Five-Year Plan there were already more than 300. Over half of them have their own scientific and technical potential and in fact are developing, distributing and using it autonomously. On the territory of the Ukrainian SSR alone about 80 union and republic departments supervise scientific and technical activity.

In recent times sectorial scientific research has been changed over more and more extensively to a contractual basis, which is one of the forms of goal program planning. The institutions of the Ukrainian SSR Academy of Sciences are doing much for the further improvement of the forms of cooperation with production collectives, which have been tested by time, as well as for the use of new forms. In our opinion, there is a very effective form--the establishment of temporary creative collectives of scientists and production workers, which are oriented toward the solution of specific major scientific and technical problems. Such collectives exist, for example, at the Institute of Cybernetics imeni V. M. Glushkov of the Ukrainian SSR Academy of Sciences and the Production Association imeni S. P. Korolev, at the Institute of Electric Welding imeni Ye. O. Paton and the Zhdanovtyazhmash Plant and others. For example, the Institute of Cybernetics and the Production Association imeni S. P. Korolev are working according to a common plan. In the shortest possible time they developed and turned over for series production the first section of the computerization of this sector of the national economy. The achieved economic impact has already exceeded 100 million rubles. The motto of this collective of scientists and production workers--"Today Basic Research, Tomorrow the Technical Policy of the Sector"--aims at efficiency and a scale approach to the solution of the entire set of problems of the development and assimilation of innovations.

A similar collective is also working very efficiently at the Institute of Material Science and the Brovary Plant of Powder Metallurgy. The latter was built in accordance with the technical assignment of the Institute of Problems of Material Science of the Ukrainian SSR Academy of Sciences. The Brovary Plant of Powder Metallurgy imeni 60-letiya Sovetskoy Ukrainy is the first enterprise in the country with a complete production cycle for the output of iron powder and items based on it and one of the best specialized enterprises of this sector not only in the USSR, but also in Europe. The plant puts out a large portion of the iron powder produced in our country and about 45 percent of the powder items. In the 18 years of existence of the plant about

20 technological processes have been assimilated and items worth more than 120 million rubles have been produced. The economic impact in the national economy comes to about 80 million rubles, while with allowance made for the increase of the service life of powder items--140 million rubles. The comprehensive scientific research, planning and design work "The Elaboration of the Scientific Principles and the Technological Processes of the Production of Powder Items on the Basis of Iron and the Organization of Their Mass Production at the Brovary Plant of Powder Metallurgy," which was fulfilled in creative cooperation with the Institute of Problems of Material Science of the Ukrainian SSR Academy of Sciences, was awarded the prize of the USSR Council of Ministers for 1980.

The specialized production of friction disks for tractors and motor vehicles by the method of powder metallurgy was assimilated for the first time in the country, owing to creative cooperation in industrial use. The organization of their mass production made it possible to increase their durability by two- to fourfold, to increase the service life of tractors and buses by two- to threefold, to decrease to one-third the labor intensiveness of the production of disks and to ten thirty-thirds the cost of production; to obtain a total economic impact of about 33 million rubles; to bring the technical level of friction disks up to the current level of the best foreign firms and corporations.[2]

Cooperation with republic and union ministries in accordance with comprehensive plans of scientific research and plans of introduction and the performance of operations in the interests of associations and large enterprises in accordance with scientific and technical goal programs have become a form of the organizational relations of science with production, which has shown itself to advantage. The themes of the scientific developments of nine ministries and departments of the republic were coordinated for 1982 within the framework of such cooperation. Here the scientific councils examined up to 900 themes, a portion of which were recommended by them for inclusion in the republic plan of the most important scientific research operations in the area of the natural sciences; the scientific councils completed 21 themes, while for the majority it made comments and recommendations.

At present the institutions of the Ukrainian SSR Academy of Sciences are maintaining contacts with enterprises and organizations of 35 union and union republic ministries, 20 ministries of the Ukrainian SSR and 10 ministries of other republics; 54 laboratories of 29 union and republic ministries, at which, for example, in 1982 95 themes were completed and of them 49 were introduced with a total economic impact of 43.5 million rubles, are in operation.

The Academy of Sciences has concluded with all the oblasts of the republic contracts on scientific and technical cooperation, of which the regional scientific, technical and socioeconomic programs for the 11th Five-Year Plan constitute the basis. These contracts were an important stage in the activity of the republic academy on the strengthening of the contact of science with production. The implementation of the contracts is making it possible to use more completely the scientific potential of the academy for solving the

scientific, technical and socioeconomic problems of those oblasts of the republic, in which there is no developed scientific base.

The Donetsk Scientific Center of the Ukrainian SSR Academy of Sciences is performing much work which is aimed at the solution of the urgent scientific and technical, economic, social and ecological problems of the Donbass. It was the first among the scientific centers of the republic to use extensively the goal program method of the planning and organization of research for the needs of a region. During the 10th Five-Year Plan five regional scientific and technical programs, which were successfully completed, were implemented in the Donbass. Their results are being used extensively in the practical work of industry. In November 1979 a meeting of scientists of the Donbass, at which the first contract in the republic on scientific and technical cooperation between the Ukrainian SSR Academy of Sciences and industrial enterprises and organizations of Voroshilovgrad and Donetsk oblasts was signed, was held in Donetsk. On the basis of this contract the Ukrainian SSR Academy of Sciences transferred to industry of the Donbass for introduction many new technologies and technological processes, which had been developed by institutions of the Ukrainian SSR Academy of Sciences. A large number of economic contracts were concluded between institutes of the Ukrainian SSR Academy of Sciences and plants and mines of the Donbass. One of the basic sections of the Donbass Program--the Comprehensive Plan on the Extensive Introduction of the Developments of Institutions of the Ukrainian SSR Academy of Sciences in the Area of New Technologies and Equipment, the Improvement of the Organization of Production, Labor and Management in the National Economy of the Donbass--was formulated on their basis.

The fulfillment of 205 scientific research jobs on 23 problems for 107 enterprises of Donetsk and Voroshilovgrad oblasts is envisaged by the plan. In all 24 academic institutes and 125 scientific institutions and industrial enterprises of the Donbass are taking part in their implementation. During 1981-1983 scientists of academic institutions performed 169 jobs, of them 117 were introduced in the practical work of the national economy with an economic impact of 47 million rubles. The sections of the Donbass Program on environmental protection and the maximum use of the byproducts and waste of industry in construction and the production of construction materials are being successfully implemented. Significant results were obtained during the implementation of the Coal, Metal, Machine Building and Labor regional scientific and technical programs.

Life has convincingly shown that just the concentration of forces and assets on the decisive directions and sections makes it possible in shortest possible time to achieve the greatest national economic impact. Such an approach is embodied in the all-union, republic, sectorial, regional and other programs on the most important directions of the progress of science and technology. The first scientific and technical programs were formulated in the republic back at the beginning of the 10th Five-Year Plan. If we speak about the republic programs, their goals and orientation are selected with allowance made for the place of the scientific, technical and production potential of the Ukrainian SSR in the all-union division of labor. The accomplishment of the assignments of the programs in many ways was conducive to the fact that the productivity of national labor in the republic increased by more than 12 percent, which is

equivalent to the saving of the labor of 2.3 million people. The entire increase of the national income--over 10 billion rubles--was obtained owing to the increase of labor productivity.3

The scientific and technical comprehensive goal programs to one extent or another encompass practically all the basic sectors of the national economy. Here more than 60 percent of all the assignments are aimed at the development of new, more advanced equipment, machines and instruments. It is envisaged to bring 45 percent of the assignments on the development of new materials and technological processes up to industrial assimilation during the current five-year plan. The development and extensive introduction in the national economy of automatic robots (manipulators) are envisaged by one of the programs in the area of machine building. First of all these will be devices for use in jobs with harmful, difficult and monotonous working conditions. In contrast to the manipulators which were developed during the 10th Five-Year Plan, it is planned to develop new components in modular design, with the use of small hydraulic, pneumatic and electric drives. The changeover from individual manipulators to the development on their basis of lines, sections and individual, completely automated manufacturing systems is envisaged. Here an increase of labor productivity by two- to threefold is expected. During the current five-year plan nearly eightfold more manipulators have to be produced than during 1976-1980.

Interconnected measures on the significant saving of fuel and energy, raw materials and materials have been included in the programs. According to a rough estimate, the economic impact from the introduction of the new equipment and technology, which are envisaged by the comprehensive programs, will [illegible] in all for the production volume for 1985 to more than 25 billion rubles.

Comprehensive goal programs make it possible to optimize the use of resources and to combine the technical and economic means of social development with the social means. In other words, program planning can become a reliable tool in the formulation and implementation of socioeconomic programs. The urgent need for the improvement of the methods and forms of the management of scientific and technical progress in case of the use of goal program methods confirmed the advisability of the establishment in the country and the republic of special organs and services, which could perform the functions of centers of the operational management of programs.

Leading scientists of academic institutions and specialists of planning and design and production organizations are making a significant contribution to the development of the integration of science, the higher school and production for the purpose of the training of highly skilled specialists; the laboratory base of these organizations is also being used much more extensively in the educational process.

Educational scientific production associations (UNPO's) are the highest organizational form of the combination of the educational process with the production process. Their goal is the improvement of ideological educational work and the vocational training of specialists for the national economy, the increase of the quality of scientific research, the shortening of the time of the introduction of scientific research developments, as well as the efficient

use of the experimental scientific and the production bases. In case of the establishment of such associations "the feedback effect" is taken into account--the scientists of a higher educational institution and a scientific research institute work in the interests of production, while production workers actively influence the educational, training and research processes.

At a number of large scientific centers and centers of higher educational institutions of the republic 116 educational scientific production associations have already been established as a voluntary service and are operating successfully. As a rule, they consists of three or four partner organizations, which jointly use the available scientific and technical potential for the solution of important scientific and technical, production, scientific pedagogical and other problems, which are not solved quickly enough and with a high enough quality by each of the partners individually. As experience shows, industrial enterprises under the conditions of educational scientific production associations obtain scientific and technical assistance from the corresponding scientific subdivisions of higher educational institutions and scientific research institutes. Industrial enterprises need such assistance in case of the lack of their own scientific subdivisions or highly skilled specialists who are capable of solving the named problems; for the acceleration of the elaboration of scientific and technical problems and the shortening of the time of the performance of operations; for the simultaneous solution of a large number of scientific and technical problems, which is hindered by the limitedness of the scientific potential of the enterprises. Moreover, the participation of industrial organizations in the work of the associations is important because it affords more extensive opportunities for the training of specialists with a higher education and high skills (candidates and doctors of sciences) for the needs of the enterprise.

The strengthening of the practical orientation of science of the higher educational institution, the acceleration of the introduction of the results of scientific research work in production, the improvement of scientific pedagogical activity and the increase of the quality of the training of specialists, as well as the improvement of the material and technical supply of the performance of scientific research and experimental design work for the needs of industrial enterprises and organizations are the reason for the participation of higher educational institutions in educational scientific production associations.

The positions of scientific research institutes of the academic and sectorial type within educational scientific production associations are characterized by the desire to introduce the available completed scientific developments in practice, to perform scientific research work in accordance with the orders of industry and to shorten significantly the duration of the "research-development-application" cycle. Moreover, such an alliance makes it possible to strengthen the material and technical supply with experimental equipment and instruments through the sectors of industry, as well as to use jointly the experimental laboratory base of the higher educational institutions which are a part of educational scientific production associations.

Such a form of the contact of science with production has become widespread in the Donbass. At present 18 such associations are operating successfully, 9 in

Donetsk Oblast and 9 in Voroshilovgrad Oblast. The Spetsmaterialy, Polimery, Metallurg, Ekonomika, Rekultivatsiya, Mashinostroyeniye and other associations have achieved significant results in the formulation of goal programs, the introduction of the results of completed research and the increase of the quality of the training of specialists. Just the associations of Donetsk Oblast in 3 years performed and introduced more than 400 jobs, which made it possible to obtain a saving of over 60 million rubles.

However, the establishment of educational scientific production associations in the republic has been carried out first of all with allowance made for the traditionally established scientific and technical relations between partners, and therefore in the majority of cases the structure and size of the subdivisions, which are a part of them, are poorly connected with the available scientific potential, the volume and nature of the problems being solved for production, as well as the regional problems of scientific and technical progress.

The integration of the efforts of academic and sectorial science and production brought into being a new organizational form--academic scientific and technical complexes, which include a research institute, a special design bureau, a special design and technological bureau, experimental works and pilot plants.

This structure makes it possible to solve the most important problems: on the one hand, to intensify basic and applied research and, on the other, to speed up drastically the development of new technologies, to increase the number of developments for many sectors of the national economy and to achieve the substantial shortening of the time of the practical implementation of scientific ideas. In particular, the Institute of Electric Welding imeni Ye. O. Paton needed only 2.5 years in order in cooperation with organizations of the Ministry of Construction of Petroleum and Gas Industry Enterprises to develop and introduce in production a new technology and sets of single-design equipment for the butt resistance welding of the pipes of gas pipelines 1,420 mm in diameter.

The establishment of scientific and technical complexes in the sphere of science is an objective necessity of the improvement of the structures of scientific institutions. The scientific complexes fully accord with the successful accomplishment of the tasks on the development of new equipment and technology. At present in Kiev there are six such complexes, five complexes are at the stage of formation.

In our opinion, engineering centers, the establishment of which has begun at large academic institutes, could become a significant form of influence on technical policy and the technical level of production in the sectors. Their task is to specify the sectors of the use of new technologies, materials, new automated control systems and so on, to turn over to enterprises models of the latest instruments, materials and technical specifications and to help in the training and advanced training of specialists.

We have a base for the establishment of such centers. For example, a permanent school of advanced know-how and a number of seminars for workers of

industry on various questions of the use of tools made from superhard materials have been organized at the Institute of Superhard Materials. Nearly 1,500 specialists of several hundred enterprises and organizations of various ministries have undergone training here.

At the Institute of Cybernetics imeni V. M. Glushkov of the Ukrainian SSR Academy of Sciences there is a program and technical complex, at which design approaches are modeled and elaborated in the interests of organizations and enterprises of various ministries and departments and assignments, which are included in scientific and technical comprehensive goal programs, are also fulfilled. At the institute it is envisaged to set up the first section of the educational methods center for problems of the development and assimilation of modern computer-aided design systems.

An educational center of welding is operating at the Institute of Electric Welding imeni Ye. O. Paton (it was organized jointly with Kiev Polytechnical Institute); engineering centers for robotics, new materials and protective coatings are being set up.[4]

The Ukrainian SSR Academy of Sciences acted as the initiator of a number of new forms of cooperation of scientists and production workers, which have successfully withstood the test of time. Among them in recent times great importance has been attached to the holding of joint meetings of the Presidium of the Ukrainian SSR Academy of Sciences and the collegiums of union and republic ministries. This form is an effective means of influencing technical policy in the sectors of the national economy. For example, in 1983 meetings were held with the collegiums of the Ministry of the Communications Equipment Industry and the Ukrainian SSR Ministry of Health and with the Presidium of the USSR Academy of Medical Sciences. At these meetings the comprehensive plans of work on research and introduction are approved. They are of great mobilizing importance and place a real basis under the expanding scientific and technical cooperation with sectorial enterprises and organizations. At present the Ukrainian SSR Academy of Sciences has joint plans with more than 20 ministries and departments.

Such forms of work as joint meetings of the party committees and scientific councils are being widely included in the practical work of scientific institutions. Thus, a contract on scientific and technical cooperation between the Ukrainian SSR Academy of Sciences and enterprises and organizations of Kiev, which envisages scientific developments which are aimed at the saving of metal, the protection and improvement of the environment, the improvement of the conditions of the storage and transportation of agricultural products, the development of automated systems for the management of the sectors of municipal services and others, was signed at a joint meeting of the Buro of the Kiev City Committee of the Communist Party of the Ukraine and the Presidium of the Ukrainian SSR Academy of Sciences.

As life has shown, the greatest success is achieved, if the contracts signed by the parties and decisions are under the daily control of the party, trade union and Komsomol organizations of scientific research institutes and enterprises. For example, the discussion of the progress of the fulfillment of obligations at the joint meetings of the party committees of the Institute

of Cybernetics imeni V. M. Glushkov and the Zhdanov Metallurgical Plant, the Kiev Industrial Association imeni Korolev and the Kiyevpromstroy Combine was useful. Such coordination of actions helps to increase the coordination and intensity of common work, to overcome the "departmental barriers," which are connected with the sectorial principle of the management of industry, and to make basic scientific research accessible to practice, as well as has a positive influence on the level of completion and the extent of introduction of scientific research and experimental design work.

On the initiative of the committees of Komsomol of the Ukraine the contacts of young scientists with people of their own age, who work at industrial enterprises and construction projects, have become an effective link in the strengthening of the relations of science with production. The young scientists of scientific research institutes, higher educational institutions and planning and design institutes, who are Komsomol members, are given directly on the job to efficiency experts and young engineering and technical personnel, who are Komsomol members, practical and procedural assistance in the search for the most efficient means of solving vital problems of technical progress and the improvement of production.

In spite of the increasing efficiency of scientific research and the greater and greater return of the labor of scientists of the republic, many more problems are in the way of the increase of the efficiency of social production. The established regional scientific centers have favorable opportunities for the strengthening of the alliance of science and production and the elimination of the obstacles in the way of scientific and technical progress. Along with the elaboration of basic problems they are aiming a significant portion of their research at the solution of practical problems. Experience has shown that the regional system of the management of scientific and technical progress effectively and harmoniously complements the sectorial system and contributes to the overcoming and elimination of departmental barriers. If we speak about the organizational and management problems of the development and use of the scientific and technical potential, in our opinion, the development and operation of automated control systems, which make it possible in a short time to process a large amount of information on the available material, manpower, financial and other production resources, which makes it possible to make in good time effective management decisions, are very significant.

The corresponding experience of the use of computers has been gained, in particular, by the Institute of Cybernetics imeni V. M. Glushkov of the Ukrainian SSR Academy of Sciences. Research, which makes it possible to formulate precise demands on the automation of the processes of management in scientific subdivisions, has been performed on computers at the institute. Positive experience in the use of the methods of network planning in the management of research and development has also been obtained. Gains have been made in the solution of the problems of automating planning and accounting activity, particularly in the solution of the problems of calculating wages. The corresponding software of automated data processing systems has been developed at the institute.

The combination of the efforts of scientists of academic institutions, sectorial scientific research institutes, higher educational institutions and the plant sector of science will help to solve important problems of an applied nature more efficiently, with fewer expenditures and a greater return, to concentrate more completely on the problems of the organization of long-range research and to add to the arsenal of forms and methods of the strengthening of the contacts of science with production.

FOOTNOTES

1. See PRAVDA, 30 March 1983.

2. See O. G. Bolshechenko and A. K. Gayduchenko, "The Outstanding Achievements of Science," VISNYK AKADEMIYI NAUK URSR, No 6, 1983.

3. See A. Titarenko, "The Impact of the Concentration of Forces," PRAVDA, 19 January 1984.

4. See B. Ye. Paton, "Accelerate Scientific and Technical Progress in the National Economy," VISNYK AKADEMIYI NAUK UKRAYINSKOYI RSR, No 1, 1984.

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ORGANIZATION, PLANNING AND COORDINATION

PROBLEMS OF INTEGRATION AT SCIENTIFIC PRODUCTION ASSOCIATIONS

Moscow SOVETSKAYA ROSSIYA in Russian 23 Jun 85 pp 1, 2

[Interview with Corresponding Member of the USSR Academy of Sciences Viktor Petrovich Belyakov, general director of the Kriogenmash Scientific Production Association, by SOVETSKAYA ROSSIYA correspondent V. Shilov: "A Formula of Integration"; date and place not specified]

> [Text] Viktor Petrovich Belyakov was one of the participants in the conference on questions of the acceleration of scientific and technical progress, which was held in the CPSU Central Committee. In an interview with our correspondent he shares his thoughts and views on the problems which were discussed.

[Question] Viktor Petrovich, at the conference your enterprise was called one of the genuine outposts of scientific and technical progress. This is, of course, not by chance. What specific end results served as the basis for such a high rating?

[Answer] The position of economic manager is such that in everyday practice it always gives more grounds for reproaches and critical remarks than for thanks and congratulations. Therefore I can say without exaggeration that the kind words in the report of Mikhail Sergeyevich Gorbachev made a stunningly pleasant impression on me. If we speak about the specific end results, they are as such. In 10 years we were able to shorten the time of the development of new equipment to one-third to two-fifths. The output of products increased by more than threefold. The share of new equipment in the total production volume comes to 60-80 percent. The needs of the country for cryogenic equipment are being met without imports. Many sectors of industry, metallurgy, the chemical industry, the petrochemical industry and power engineering have been supplied with reliable air-fractionating units and cryogenic storages. Among the latest achievements are new systems of the cryogenic supply of superconducting power and electrical equipment complexes, as well as gas-fractionating units, which do not have analogues in the world and have found use in the most different sectors of the national economy.

[Question] The scientific and technical revolution presumes the transformation of science into an immediate productive force. At the conference in the CPSU Central Committee it was said that for this purpose it

is necessary to improve the established organizational economic forms. Can it be said that you were able to find the optimum formula of integration?

[Answer] Several years ago in my interview with you I already had occasion to name such a formula of the integration of science, technology and production. It is the scientific production association. The complex process of the development and introduction in the national economy of new equipment, in which scientists, designers, process engineers and production workers participate, is sped up noticeably within such a unified organization. I will cite personal experience. Once when the director of an institute I saw with bitterness that the more actively the collective works, the more folders, but not more machines, are added to the shelves. More than once I shared by dissatisfaction with executives of the Ministry of Chemical and Petroleum Machine Building. And then more than 10 years ago a scientific research institute and two machine building plants--an experimental one and a series-producing one--were brought together into the scientific production association of cryogenic machine building. The responsibility both for the scientific and technical level and for the meeting of the needs of the national economy for highly efficient cryogenic equipment was assigned to the enterprise. They entrusted me with the management of this large scientific economic complex. Of course, some time was needed for the so-called organizational period, for the mastering of the new official functions. However, today as a scientist and designer I can say with satisfaction that precisely the management of the scientific production association enabled us in a short time to implement many scientific ideas.

[Question] As is known, your efforts have been appreciated. It has been several years since you were elected a corresponding member of the USSR Academy of Sciences, while 2 years ago you were awarded the title of Hero of Socialist Labor. But then your statements in the press and at conferences of various levels are most often highly critical. The impression is such that, as they say, you still do not have many a thing for complete happiness.

[Answer] Our many years of experience convince us that for the present we are not making full use of the potentials which are incorporated in the structure of the scientific production association. The ambivalence in realizing the long-range intention of our decisions is interfering. On the one hand, we seem to be setting up a fundamentally new scientific economic subdivision and, on the other, we want it to be included in the framework of the former management systems and to be managed by the old procedural rules.

Such inconsistency is sowing disagreement in the economic interests of various subdivisions and discord in the methods of management and, in the end, opposes the goals, for the sake of which the scientific production association was established. Here, for example, up to now planning at the scientific production association has proceeded along two parallel lines. The thematic plan, which belongs to the sphere "Science and Scientific Service," is approved for the scientific research institute. This is the line which is controlled by the USSR State Committee for Science and Technology. A long-range plan, which belongs to the sphere "Production" and is controlled by the USSR State Planning Committee, is given to the plants. The results of all the combined activity of the association are evaluated only according to the

volume indicators without regard for what equipment we are producing--the most advanced equipment or we are copying series-produced products. Thus, the development and introduction of highly efficient commercial equipment in fact is not stimulated by the plan. On the other hand, even at a scientific production association at times it is more profitable to develop expensive equipment and to copy it a little longer.

Furthermore, at present two systems of the remuneration of the labor of personnel: for the plant and for the institute, and three systems of material stimulation: for the plant, for the institute and for the management of the association, are in effect at scientific production associations. This disconnects the interests of workers. It is clear that a unified system of the remuneration of labor and material stimulation, as well as a system of the crediting of economic stimulation funds, which is common to the entire association, should be in effect at the scientific production association. We have been posing these problems for 13 years now at the most different levels. They as if agree with us, but practical solutions do not follow this.

[Question] It seems that our remark about the two parallel lines of planning is correct not only as applied to the practice of scientific production associations. In essence at any enterprise the production plans do not intersect with the plans of scientific and technical measures.

[Answer] In this connection the task posed at the conference in the Central Committee on the consolidation of the plant sector of science today seems very important to me. As a rule, the functions of scientific research institutes and design bureaus are limited to the formulation of the detail design of an item, which is turned over to the production association or enterprise for contractor designing and its assimilation in production. Within a single enterprise there are more possibilities to unite and to orient toward a goal the efforts of scientists, designers and production workers.

[Question] How, in your opinion, is it possible to give new organizational economic momentum to the development of the network of large scientific production associations?

[Answer] In my opinion, practice is placing on the agenda the question of setting up All-Union Scientific Production Associations (VNPO's). It would also be necessary to make them responsible for the complete supply of the national economy of the country with reliable and advanced equipment in accordance with the specific products list which has been approved for it. For example, in addition to ours, another three scientific production associations and two plants are also working in the area of cryogenic equipment. For the better coordination of forces it is logical to merge all these associations and plants into a single All-Union Scientific Production Association for Cryogenic Machine Building. It is also necessary to set up similar all-union scientific production associations for other ranges of items. It is advisable to do this in machine building as a whole. A general designer--the responsible manager of the association, who is directly subordinate to the ministry--should head the all-union scientific production association. In this sense the Leningrad Svetlana Association merits the most serious attention. Does not technical progress go hand in hand here with

production because there is no intermediate instance between the general director and the collegium of the ministry?

I fully support the idea of transforming the State Planning Committee into the central scientific and economic organ of the country. Today procedural statutes on planning, pricing, the evaluation of the scientific and technical level and quality of products and the economic stimulation of the development of highly efficient equipment are being drawn up by various departments--the USSR State Planning Committee, the USSR State Committee for Prices and the USSR State Committee for Science and Technology. Frequently the documents, which are important for us, in essence are not interconnected, and in a number of cases come into direct conflict. For example, so that the assimilation of new equipment would not decrease our financial and economic tone, the State Committee for Prices permits the level of the profitability of a product to be limited to 20 percent. However, the State Planning Committee has its own methods. And on their basis they establish for us a standard of profitability of not less than 27 percent. If we do not achieve it, hence we will be upsetting the plan of the profit. The general director is faced with a choice: Which is to be fulfilled--the plan on the development of new equipment or the plan on the profit by means of the copying of series-produced, but highly profitable products? The choice is difficult, if you consider that the upsetting of the plan on the profit entails a substantial decrease of the economic stimulation funds and sanctions of the USSR State Bank in the form of increments on the interest for credits.

This example is not an exception. How is the scientific and technical level of equipment evaluated? The highest mark is the State Emblem of Quality. In accordance with the method it is conferred according to the results of official interdepartmental tests. In case of the development of complex new equipment its testing is possible only after installation at the client's, when a long time, at times years, passes between the delivery of the equipment and its placement into operation. The enterprise is under unprofitable conditions, since during this period the proportion of products with the State Emblem of Quality decreases, the markups on the price and the deductions for incentive funds are lost. The coordination of prices is very drawn out. Due to the different positions of the State Committee for Prices and the State Committee for Standards for 3 months we were not able to obtain an approved price for our new system of the storage and distribution of cryogenic products, which was produced for Karaganda metallurgists, although the client already has the equipment. I could continue the list of conflicts and discrepancies between the departmental methods.

[Question] But what must be done so that there would be no such examples?

[Answer] In our opinion, all instructional documents should emanate from one center--the USSR State Planning Committee--and should be completely interconnected. But if we look more closely, the planning of all the stages of the development and series production of new equipment and the procedural management of the national economy should not be dispersed among different committees, but should be in the hands of one state committee.

[Question] Viktor Petrovich, we are now talking with you not for the first time, and each time the conversation, bypassing questions of a scientific nature, turns to problems of the organizational economic level.

[Answer] Because these problems already became long ago literally a dam in the way of the implementation of the most promising developments. Unfortunately, too often science knocks in vain at the door of practice. I have personally been lucky. In my hands there are a powerful scientific research and design staff, as well as a large production base. If one did not have to spend time on overcoming the procedural barriers inherited from the past and to wander in the tangled labyrinths of conflicting instructions, the scientific production association is an exceptionally favorable opportunity for the implementation of creative ideas. What scientist does not dream of this?

[Question] Meanwhile practical production today has an acute lack of technical revolutionaries. The acceleration of scientific and technical progress in many ways depends on the influx of fresh innovative personnel. Thus, has a period perhaps started, when one should call professors to administrative management activity? Will volunteers to exchange the academic respectability of chairs and laboratories for the hectic position of manager of a works be found?

[Answer] I am convinced that they will be found. And why not in practice announce something like a party appeal? I support the idea that more prominent scientists and designers would become immediate organizers of the cooperation of science and production. This is one of the basic conditions of the successful integration of science, technology and production.

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ORGANIZATION, PLANNING AND COORDINATION

BOOK VIEWS PROBLEMS OF REGIONAL MANAGEMENT OF S&T PROGRESS

Moscow OBSHCHESTVENNYYE NAUKI V SSSR, SERIYA 2: EKONOMIKA in Russian No 3, May-Jun 85 pp 52-56

[Review by T. A. Notkina of book "Problemy regionalnogo upravleniya nauchno-tekhnicheskim progressom: teoriya, metodika, praktika" [Problems of the Regional Management of Scientific and Technical Progress: Theory, Methods, Practice], Ya. S. Podstrigach, editor in chief, the USSR Academy of Sciences, the Ukrainian SSR Academy of Sciences, the Western Scientific Center, the Lvov Department of the Institute of Economics, Nauka, Moscow, 288 pages, bibliography: pages 282-286]

[Text] The book consists of eight chapters.

The first chapter is devoted to the methodological principles of the regional management of scientific and technical progress. The authors substantiate the need for the systems management of the scientific and technical revolution in the region. Given their approach sectorial and territorial management form two interconnected subsystems of the unified comprehensive system of the management of the scientific and technical revolution. In this case scientific and technical progress becomes an object of both sectorial and territorial management. The long-term comprehensive programs of scientific and technical progress in the sectors of the region are considered as one of the most important components of the system of the territorial management of scientific and technical progress. The need for the formulation of programs of this sort is dictated first of all by the need to solve such a complicated problem as the choice of the most effective means of the long-term comprehensive economic and social development of the region. The first attempt at the formulation and implementation of long-term regional programs of scientific and technical progress (Donetsk Oblast) is described.

In the second chapter the forms of the regional management of scientific and technical progress are examined. The chapter begins with an analysis of the experience of regional influence on the acceleration of scientific and technical progress in the Ukrainian SSR. One of the first forms of regional management is the solution of the problems of scientific and technical progress within the unified comprehensive plan of the economic and social development of the region. The authors substantiate the need for independent forms of the regional management of scientific and technical progress: the

drafting of coordinating plans of scientific research and the introduction of its results in practice, the establishment of a system of the territorial management of scientific and technical progress, the drafting and implementation of a comprehensive plan of scientific and technical progress in the leading sectors of industry within the region, the formulation of comprehensive goal programs, the establishment of interdepartmental special-purpose scientific production associations.

Further the experience of the work of the Donetsk Scientific Center of the Ukrainian SSR Academy of Sciences on the formulation of a comprehensive plan of scientific, technical and socioeconomic research is revealed. This experience shows that comprehensive planning is the most promising form of the management of scientific and technical progress.

In the third chapter the role and place of interdepartmental scientific production complexes (MNPK's) and interdepartmental special-purpose scientific production associations (MTsNPO's) in the management of scientific and technical progress in the region are examined. Interdepartmental special-purpose scientific production associations and interdepartmental scientific production complexes were established in the Western Region of the Ukrainian SSR for the implementation of intersectorial goal programs. The system of the management of intersectorial goal programs in the Western Region of the Ukrainian SSR at present is represented by three levels of management: the highest--the territorial scientific center of the Ukrainian SSR Academy of Sciences, the middle--interdepartmental scientific production complexes and the lowest--interdepartmental special-purpose scientific production associations. The contract on creative cooperation between academic scientific institutions and enterprises (associations) is the organizational and legal basis of the establishment and operation of interdepartmental special-purpose scientific production associations. Among the tasks of interdepartmental scientific production complexes and interdepartmental special-purpose scientific production associations there are named: the formulation and implementation of scientific and technical comprehensive goal programs and subprograms; the preparation of recommendations on the use of the results of research in related sectors of industry; the dissemination of the experience of the development and introduction of scientific and technical achievements; the training of personnel for the use of the results of developments. The activity of the interdepartmental special-purpose scientific production associations and interdepartmental scientific production complexes created a realistic basis for the consolidation of the problems of scientific research owing to the possibility of concentrating the scientific potential on the general directions of development. The production of fundamentally new equipment and the use of the scientific and technical potential of the region have intensified significantly. The mutual interest of the members of interdepartmental special-purpose scientific production associations and interdepartmental scientific production complexes has increased.

In the fourth chapter the organizational mechanism of the management of interdepartmental complexes and associations is examined. The authors propose a system of the operations on the formation of organs of management, which includes the following stages: a) the determination of the set of goals of

the operation of interdepartmental special-purpose scientific production associations and the construction of a tree of goals; b) the determination of the composition and set of operations on the program and the sequence of the fulfillment of its parts and on the basis of this the substantiation of the content of the processes of management; c) the differentiation of the strategic tasks of the management of the formulation of the draft of the program, the long-range and current tasks of the management of the elaboration and implementation of program measures; d) the distribution of functions in the system of management of interdepartmental special-purpose scientific production associations and the elaboration of a diagram of the organs of management. The structure of the management of interdepartmental special-purpose scientific production associations can be linear-program, coordinating or matrix. The advisability of the use of one type or another of the structures stems from the possibility of forming the corresponding organizational economic mechanism of the management of the program. Each stage of the work is formed into a separate subprogram, the management of which is carried out by the director of the subprogram.

In the fifth chapter the questions of the formulation of scientific and technical comprehensive goal programs are studied and the substantiation of their effectiveness is given. The authors discuss in detail the methods of evaluating the effectiveness of goal programs. In the practice of the operation of interdepartmental scientific production complexes and interdepartmental special-purpose scientific production associations the annual economic impact, which is calculated in conformity with the principles of the method of determining the efficiency of the use in the national economy of new equipment, is used for substantiating the program. It is determined for each measure of the program. The authors propose their own method of determining the effectiveness of the program and believe that the effectiveness of the implementation of a program should be calculated with respect to the following components: 1) the effectiveness of the development and use of the program product in the national economy; 2) the effectiveness of the program organization of operations; 3) the effectiveness of the creation and introduction of developments, which are aimed at the achievement of the program goal, but will also be used for the achievement of other nonprogram goals.

The sixth chapter is devoted to the questions of the standard support of programs at interdepartmental scientific production complexes and interdepartmental special-purpose scientific production associations. The general demands, which are made on the standard indicators of the goal program, are formulated. Various methods of the calculations of the standards of expenditures on the implementation of the goal program: the statistical, analogue and research methods, as well as the method of determining the specific expenditures per unit of the base technological characteristics are examined.

In the seventh chapter the problems of the management of the scientific and technical potential at interdepartmental scientific production complexes and interdepartmental special-purpose scientific production associations are analyzed. A system of the analysis of the scientific and technical potential, which envisages the study of the key components, is proposed. Then the method

of determining the level of the supply of programs with the scientific and technical potential is given. Here the level of supply with the scientific and technical potential with respect to each of its components is calculated, which makes it possible to evaluate the conformity of the needs of the program to the possibilities of the scientific and technical potential.

It is proposed to calculate the level of the organization of the process of using the scientific and technical potential by means of indicators of two types: the continuity and proportionality of the use in time of the potential capacity of the components of the potential. For the evaluation of the economic efficiency the authors consider it advisable to use the indicator of the output-resource ratio, which is introduced by analogy with the well-known indicator of the output-capital ratio. The output-resource ratio is regarded as a generalizing economic indicator.

In the eighth chapter the organizational economic control of product quality at interdepartmental scientific production complexes and interdepartmental special-purpose scientific production associations is discussed. It is noted that the goal programs, which are presently being formulated, scarcely contain qualitative indicators. For the assurance of the conformity of the program product to the requirements of the highest quality category it is proposed to use as the basis for comparison the forecast values of the indicators of the best foreign models. A critical analysis of the method of adjusted expenditures, which is presently being used, is given. The following criterion of the advisability of developing a new program product is proposed: 1) the conformity of the parameters of quality to the best domestic and foreign models; 2) the recovery of the additional capital investments should correspond to the standard recovery. In the opinion of the authors, the system of control of the quality of the program product should be formed from three subsystems: the executive, the supply and the monitoring and control. The first system accomplishes the tasks on the achievement of the set level of quality; the second--on the creation of the conditions for the effective operation of the subdivisions of the performers; the third--on the planning of the coordination and the control of the work of interdepartmental special-purpose scientific production associations.

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ORGANIZATION, PLANNING AND COORDINATION

ORGANIZATIONAL, LEGAL BASES OF INTRODUCING S&T ACHIEVEMENTS

Moscow MEKHANIZM VNEDRENIYA DOSTIZHENIY NAUKI. POLITIKA, UPRAVLENIYE, PRAVO in Russian 1985 (signed to press 3 Dec 85) pp 1-8, 285-286

[Annotation, introduction and table of contents from book "The Mechanism of the Introduction of the Achievements of Science. Policy, Management, Law" by Vitaliy Petrovich Rassokhin; Doctor of Juridical Sciences V. A. Rassudovskiy, editor in chief; the Institute of State and Law of the USSR Academy of Sciences, Izdatelstvo "Nauka", 3,350 copies, 286 pages]

[Text] The monograph is a comprehensive study, which was undertaken for the purpose of formulating the organizational and legal bases of the unified statewide system of the introduction of the achievements of science and technology in production. An analysis and appraisal of the prevailing legislation, which regulates the relations connected with the use of the results of research in production, are given and organizational mechanisms and legal forms, which promote the more extensive introduction of fundamentally new achievements of science and technology, are proposed.

Introduction

The new needs of socioeconomic development, which are attributable to the present scientific and technical revolution, and the vital necessity of the rapid increase of the efficiency of social production have posed with previously unprecedented urgency the problem of introducing the achievements of science and technology. A task worthy of mature socialist society--to combine in fact the achievements of the scientific and technical revolution with the advantages of the socialist economic system--has arisen for our society.

The importance of the problem of introducing the achievements of science and technology at present is especially increasing in connection with the fact that the possibilities of the growth of social production by means of extensive factors (the increase of capital investments, the attraction of additional manpower and so on) are becoming more and more limited. That is precisely why the acceleration of scientific and technical progress is now being put in first place as the main means of development of the economy--from the point of view of both the immediate tasks and the long-term future.

An enormous production, technical and scientific potential, which is making it possible to accomplish large-scale tasks on the increase of the scientific and technical level of the national economy, has been created during the years of recent five-year plans. The base sectors, which govern scientific and technical progress, are developing stably. The positive changes in the structure of domestic machine building are affording opportunities to equip the national economy on a more and more extensive scale with modern machines, devices and instruments. In 1983 alone the output of about 3,500 new types of highly productive equipment was assimilated. The production base of atomic energy, to which a special place belongs in the implementation of the Energy Program, is being strengthened rapidly.[1]

"These years have been marked by considerable achievements...," K. U. Chernenko indicated in a speech to voters on 2 March 1984. "In our country, for example, a unique nuclear reactor with a rating of 1.5 million kW has been developed. The powerful nuclear icebreakers, which were built in our country, have opened a new chapter in the history of the development of the Arctic. The prospecting of the depths of the earth by means of ultradeep wells has begun. Technical lasers have begun to be used extensively in industry and medicine."[2]

The construction of the Baykal-Amur Railway Line and the unique Urengoy-Pomary-Uzhgorod gas pipeline also attests to the increased potential scientific and technical level of our economy. The early completion of the construction of the gas pipeline, through which Siberian gas is being delivered to Western Europe, in many ways was determined by the intensive introduction of the latest achievements of science and technology. In addition to this gas pipeline, another five very large gas routes run from Urengoy. Although they are inferior in length to the indicated route, they are being built from pipe of the same diameter, are equipped with the same pumping equipment and in complexity scarcely differ from the Urengoy-Uzhgorod route. The mass introduction of the achievements of science and technology is one of the main peculiarities of the building of Siberian gas pipelines and other new priority construction projects.[3]

The experience of the large-scale assimilation of modern equipment and technology, which had been gained in individual leading sectors, was the basis for the organizational and economic methods and new forms of introduction, which were envisaged by the decree of the CPSU Central Committee and the USSR Council of Ministers "On Measures on the Acceleration of Scientific and Technical Progress in the National Economy" of 18 August 1983.[4]

The introduction of major, fundamentally new achievements of science is the main means of the intensification of the economy. Precisely "with the introduction in practice of the achievements of science and technology... the situation is still bad," it was indicated at the June (1983) CPSU Central Committee Plenum. "The economic manager, who has taken a 'risk' and introduced at the enterprise new technology, has used or produced new equipment, frequently is the loser, while whoever shuns innovations, loses nothing. To elaborate such a set of organizational, economic and moral measures, which would interest in the updating of equipment both managers and

workers and, of course, scientists and designers and would make work in the old way unprofitable--that is the task."[5]

In the age of the scientific and technical revolution no longer individual achievements of science and technology, no matter how brilliant they are, but a high scientific and technological level of all production is becoming the main thing. In spite of the taking of a number of steps and the adoption of a number of enforceable enactments, the real possibilities of the influence of "large-scale science" on the development of production and on technical policy in the sectors of the national economy still remain inadequate. "The decisive, most urgent section today is the introduction of scientific discoveries and inventions," it was indicated at the 26th party congress. "...It is necessary to eliminate everything that makes the process of introducing what is new difficult, slow, painful.... The accomplishment of this task is, of course, a difficult matter, which requires the breaking of obsolete habits and indicators. But it is entirely necessary for the country, for the people, for our future."[6]

It is possible to characterize the now existing "system of introduction" entirely as a departmental-sectorial system. The development of a statewide system of the introduction of the achievements of science and technology, which would be able to make the cornerstone fundamentally new, pioneering scientific and technical achievements of intersectorial (national economic) importance, is becoming vitally necessary. The need for such a statewide system of introduction, which does not reduce to the simple aggregate of departmental-sectorial systems, also follows from Article 26 of the USSR Constitution, in accordance with which the state organizes the introduction of the results of scientific research in the national economy and other spheres of life.

It is impossible to overestimate the importance of the effective accomplishment of the task, which was posed by the party, of overcoming the difficulties with the introduction of major discoveries and inventions in production. "We absolutely need to ensure the rapid and continuous updating of all the sectors of the national economy on the basis of the current achievements of science and technology," K. U. Chernenko stressed in a speech to voters on 2 March 1984. "This is one of our basic tasks. Without this the progress of society is simply inconceivable."[7]

The problem of introduction has been examined in various aspects in many works of economics scholars and scientists of science.[8] In the majority of them, as a rule, the individual stages of the "research-development-production" cycle or the entire cycle as a whole are studied, while the introduction of the achievements of science and technology is considered as one of the stages of such a cycle. Here the questions of the reimbursement of the expenditures of enterprises and the material stimulation of their collectives, that is, the problem of the profitability of introduction, are at the center of attention of economists. The fruitfulness of the research of economists, which is aimed at the elaboration of the conditions of the mass introduction of scientific results which modernize sectorial production, is confirmed by the legislative introduction in the sectors of industry of the cost accounting system of the

development of scientific and technical progress, which is based on specific conclusions and suggestions which are contained in this research.

Several aspects of the problem of introduction have also been touched upon in legal literature. Attention was mainly devoted to them among other problems in legal research which is devoted to a wide range of questions of the organization of science and scientific and technical progress.[9] In individual works the general approaches to the problem of introduction were outlined.[10] In several monographs the problem was studied along the lines of one area of law, namely from a civil law standpoint,[11] either from the standpoint of the connection of invention law and the legal forms of the development and introduction of new equipment[12] or from an economic legal standpoint.[13] A candidate dissertation was devoted to the study of the enforceable enactments, which pertain to the questions of the regulation of the relations of academic institutes with the sectors of production and affect in addition the sphere of the introduction of scientific results.[14]

In this monograph the author set himself the task, based on the elaborated initial positions and the studied hierarchy of socioeconomic factors which hinder the extensive implementation of major scientific achievements in production, to determine the organizational legal principles, which are equal to the needs of the transformation of the contradiction between science and production and on which a statewide system of the introduction of the achievements of science and technology, which is not reducible to a simple set of departmental-sectorial systems which are isolated from each other, could be formed.

In case of the development of this system of introduction the fundamentally new achievements of science and technology, which are capable of revolutionizing production, are of central interest. A strictly differentiated approach, which distinguishes the problems of the creation of the economic, organizational and legal conditions of the introduction of fundamentally new achievements from the problems of the improvement of the prevailing conditions of the introduction of scientific and technical achievements which modernize sectorial production, was adopted in the monograph.

The unified scientific and technical policy, which serves as one of the most important units in the overall system of the economic policy of the intensification of production, management (the state organizational means and methods of accomplishing the large-scale goals of the introduction of the major achievements of science, which are determined by the system of the unified policy), as well as the legal forms, in which the unified scientific and technical policy is pursued and management is realized, play the basic role in the statewide mechanism of the introduction of the achievements of science. That is why precisely these three basic units of the mechanism of introduction: policy--management--law, were entered in the title of the work.

Of course, this work does not aspire to the coverage of the enormous and diverse set of socioeconomic and organizational legal questions which pertain to the problem of introducing the achievements of science and technology. The study is focused first of all on the questions of the creation of the

conditions, mechanisms and forms of the unified state scientific and technical policy and the system of the introduction of scientific achievements of an intersectorial nature, which corresponds to it. Such aspects of the problem of introducing the achievements of science and technology, which have already been subjected to studies in the literature, for example, those which are a part of the special set of questions of the establishment and activity of scientific production associations, as a rule, are not examined in the monograph.

The achievements of the natural and technical sciences, including inventions, were selected as the objects, with regard to which the relations studied in the monograph form and to which the attention of the author is confined. The science of science, which has formed by now, deals precisely with these objects.

FOOTNOTES

1. See PRAVDA, 6 November 1983.

2. Ibid., 3 March 1984.

3. See KOMMUNIST, No 16, 1983, pp 35-36.

4. See SP SSSR, No 24, 1983.

5. "Materialy Plenuma Tsentralnogo Komiteta KPSS, 14-15 iyunya 1983 goda" [Materials of the CPSU Central Committee Plenum, 14-15 June 1983], Moscow, Politizdat, 1983, pp 10-11.

6. "Materialy XXVI syezda KPSS" [Materials of the 26th CPSU Congress], Moscow, Politizdat, 1981, p 43.

7. PRAVDA, 3 March 1984.

8. See, for example, L. M. Gatovskiy, "Ekonomicheskiye problemy nauchno-tekhnicheskogo progressa" [Economic Problems of Scientific and Technical Progress], Moscow, Ekonomika, 1971; V. I. Pavlyuchenko, "Ekonomicheskiye problemy upravleniya nauchno-tekhnicheskim progressom" [Economic Problems of the Management of Scientific and Technical Progress], Moscow, Nauka, 1973; V. I. Kushlin, "Uskoreniye vnedreniya nauchnykh dostizheniy v proizvodstvo" [The Acceleration of the Introduction of Scientific Achievements in Production], Moscow, Ekonomika, 1976; V. G. Shteyngauz, "Ekonomicheskiye problemy realizatsii nauchno-tekhnicheskikh razrabotok" [Economic Problems of the Implementation of Scientific and Technical Developments], Moscow, Nauka, 1976; Yu. D. Amirov, "Nauchno-tekhnicheskaya podgotovka promyshlennogo proizvodstva (Voprosy teorii i praktiki)" [The Scientific and Technical Preparation of Industrial Production (Questions of Theory and Practice)], Moscow, Ekonomika, 1978; G. A. Nesvetaylov, "Nauka i yeye effektivnost" [Science and Its Efficiency], Minsk, Nauka i tekhnika, 1979; Yu. O. Krivonosov, "Sovershenstvovaniye organizatsii i upravleniya nauchnymi issledovaniyami v chernoy metallurgii" [The Improvement of the Organization and Management of Scientific Research in

Ferrous Metallurgy], Moscow, Metallurgiya, 1979; "Upravleniye NIOKR (Issledovaniya, razrabotki, vnedreniye)" [The Management of Scientific Research and Experimental Design Work (Research, Development, Introduction)], Moscow, Ekonomika, 1979.

9. See "Pravovye voprosy nauchno-tekhnicheskogo progressa v SSSR" [Legal Questions of Scientific and Technical Progress in the USSR], Moscow, Nauka, 1967; V. A. Rassudovskiy, "Gosudarstvennaya organizatsiya nauki v SSSR" [The State Organization of Science in the USSR], Moscow, Yuridicheskaya literatura, 1971.

10. See V. P. Rassokhin and M. P. Ring, "Law and the Introduction of the Achievements of Science and Technology," SOVETSKOYE GOSUDARSTVO I PRAVO, No 3, 1973; "Organizatsionno-pravovyye voprosy rukovodstva naukoy v SSSR" [Organizational Legal Questions of the Management of Science in the USSR], Moscow, Nauka, 1973.

11. See V. A. Dozortsev, "Zakonodatelstvo i nauchno-tekhnicheskiy progress" [Legislation and Scientific and Technical Progress], Moscow, Yuridicheskaya literatura, 1978; I. A. Zenin, "Nauka i tekhnika v grazhdanskom prave" [Science and Technology in Civil Law], Moscow, Izdatelstvo MGU, 1977.

12. See A. A. Podoprigora, "Pravovyye voprosy sozdaniya i vnedreniya novoy tekhniki" [Legal Questions of the Development and Introduction of New Equipment], Kiev, Vishcha shkola, 1975.

13. See Ye. P. Torkanovskiy, "Sozdaniye i vnedreniye novoy tekhniki na predpriyatii (Pravovyye voprosy)" [The Development and Introduction of New Equipment at the Enterprise (Legal Questions)], Moscow, Yuridicheskaya literatura, 1972; M. P. Ring, "Khozraschetnaya sistema sozdaniya i vnedreniya novoy tekhniki (Pravovyye problemy)" [The Cost Accounting System of the Development and Introduction of New Equipment (Legal Problems)], Moscow, Nauka, 1982.

14. See N. A. Gordeyeva, "Organizational Legal Problems of the Transfer and Use in Practice of the Results of Research of Academic Scientific Institutions," candidate dissertation, Moscow, IGP AN SSSR, 1980.

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BUDGET AND FINANCE

EVALUATION, REMUNERATION OF WORK OF SCIENTIFIC ORGANIZATIONS

Kiev EKONOMIKA SOVETSKOY UKRAINY in Russian No 5, May 85 pp 57-63

[Article by Candidate of Economic Sciences L. Lyakh: "On the Evaluation of and Payment for Completed Works of Scientific and Technical Organizations"]

[Text] The increase of the proportion of intensive factors in the growth of the Soviet economy predetermines the need for the significant increase of the efficiency of the work of scientific research, planning and design and technological organizations.[1] But this in many ways depends on the degree of perfection of the methods and forms of the management of the activity of scientific and technical organizations and, in particularly, the methods of the evaluation of and the forms of payment for completed scientific research work and experimental design development. During the 11th Five-Year Plan it is proposed to complete the changeover of scientific and technical organizations to the system of payment for work, which has been completely finished and has been accepted by the client. Several means of the practical solution of this problem, for example, the economic experiment in the sectors of industry, have been proposed.

The generalization of the basic results of the search for these means, which was made by us, showed that the elaboration of the problem is still far from completion. The experienced specialist, as a rule, evaluates in a purely empirical way the suggestions being elaborated, frequently proceeds from the departmental interests of the developing organizations and does not coordinate them enough with the general principles and requirements of the construction of a cost accounting system of the management of scientific and technical progress in the national economy. At the same time theoretical and methodological developments, no less than the instructional procedural materials on the evaluation of and payment for completed scientific research work and experimental design development, cannot and should not be elaborated by themselves. They are an integral, component part of the overall system of cost accounting and should be completely coordinated with its general principles and requirements.

The sphere of use of the cost accounting methods of management is continuously broadening. But whereas in the sphere of physical production the used cost accounting methods of management have received scientific substantiation and extensive practical development, in the sphere of the management of scientific

and technical activity they are at the stage of formation. The question of the nature and forms of cost accounting in the sphere of the activity of scientific and technical organizations is still poorly developed, the theoretical and methodological approach to the construction of the mechanism of the management of the process of the development, assimilation and introduction of new equipment is being underestimated. This mechanism is based on the making of a fetish out of the peculiarities of scientific and technical activity and does not take into account its physical and material orientation. Therefore, the erroneous thesis that cost accounting is entirely inapplicable to the activity of scientific research institutes and design bureaus, that cost accounting in science has its own economic nature and forms of implementation, which are different from physical production, and that it can be a question only of its individual components, was advanced instead of focusing efforts on the development of a comprehensive cost accounting system of the management of the process of the development, assimilation and introduction of new equipment. As a result a complex, cumbersome and contradictory mechanism, which it is difficult to call a cost accounting mechanism, was constructed.

In case of the improvement of the forms of the payment for and the methods of the evaluation of completed scientific research work and experimental design development, as with any other component of the cost accounting mechanism of the management of scientific and technical progress, one should proceed from the general principles of cost accounting, while taking into account the specific nature of scientific and technical activity as an object of management. The latter consists in the fact that the cost accounting methods of management should be aimed first of all at the personal component (the scientific and technical collective) and the end economic result of creative scientific and technical work. Cost accounting presumes, first, the relative economic isolation of scientific research institutes and design bureaus, which consists in their initial provision with internal capital and the self-management of the individual reproduction of internal resources, on the basis of the goals which have been set for social reproduction as a whole. Second, the transfer of completed scientific and technical developments should be carried out strictly on a compensatory basis, that is, in the form of the sale of the final product at prices which are determined in accordance with established procedure. The reimbursement of the expenses and the assurance of the profitability and a given level of efficiency of the work of scientific research institutes and design bureaus should constitute a mandatory component and the economic basis of their activity. Third, since the relative economic isolation of scientific research institutes and design bureaus is also expressed in the isolation of collective interest from public interest, a system of the material stimulation of scientific and technical organizations, which is oriented toward the end result, is needed as a means of coordinating these interests.

Thus, cost accounting acts as a method of the management of the activity of scientific and technical organizations, which is implemented by the attachment to them of a specific portion of the public resources, the compensatory exchange of the products of scientific and technical activity and the assurance on the basis of such exchange of the continuous, relatively closed circulation of the allocated resources with the maximum mobilization of

creative initiative for the achievement of the basic goals of scientific and technical policy, which are reported to scientific and technical organizations in the form of plan indicators and economic standards.

The question of the evaluation of and the payment for completed scientific research work and experimental design development, which is of fundamentally great importance, should be settled in conformity with this understanding of the nature of cost accounting of scientific and technical organizations. In the methods and forms of the economic evaluation of and the payment for completed work the basic content of cost accounting as a method of planned management is reflected in concentrated form, since each time the entire cycle of economic contractual relations between the performer and user of developments concludes with the act of the evaluation of and the payment for completely finished work.

Until recently the financing of scientific and technical organizations was carried out by the quarterly opening of credit for paying all the expenses, while in case of the performance of operations in accordance with economic contracts by the payment of an advance and by subsequent settlements for the individual stages of the operations. Thereby the process of work, and not its end results, was paid for. In case of an unsatisfactory result a certain set of sanctions was used, but it was ineffective.

The changeover of scientific and technical organizations to the system of settlements for work, which has been completely finished and has been accepted by the client, instead of the stage-by-stage payment for operations is one of the most promising measures in the area of the consolidation and development of cost accounting in the sphere of scientific and technical activity. However, it is being carried out slowly and in a number of cases formally, since the financing of individual themes by the granting of intermediate bank credits, as before, is being carried out by stages with the mere difference that the stages have become longer. The reason for this consists, in our opinion, in the fact that the guidance materials[2] on the improvement of the system of payment have not been brought to a logical conclusion from the point of view of the consistency and completeness of the implementation of the principles of cost accounting and do not contain a clear specification of the economic content of the concepts "the scientific and technical development," "the use value of the development," "the cost and price of the development." Instead of payment for the results of work, by which first of all the increase of the efficiency and quality of the final product should be understood, the complete reimbursement of the expenses practically without regard for the level of the efficiency and quality of developments is envisaged. The stipulations concerning the fact that the payment for work should be made in accordance with the revised or depreciated estimated cost and that the cost of the operations, which are to be paid for, should not exceed the actual expenses by more than 3 percent, do not, in essence, change anything.

The cost accounting principles of the management of scientific and technical activity are realized most completely in case of the provision of scientific and technical organizations with internal working capital. In this case scientific and technical organizations turn into independent, relatively closed systems, which have, on the one hand, internal capital, plan

assignments and standards and, on the other, a final product in the form of new scientific and technical information of ways of increasing the technical level and economic efficiency of new tools and objects of labor and technologies, as well as revenues which exceed the expenditures of scientific and technical organizations, by means of which the funds of the simple and expanded reproduction of the production and pilot experimental base, economic stimulation funds, reserve funds and others are formed. The internal working capital is isolated, thus, from the assets of other organizations and makes it possible to implement effective control by the ruble over the effectiveness of expenditures with the complete economic liability of the developers to the client for the results of their activity (including the complete reimbursement of the caused economic harm due to the low quality performance of operations, deviation from the specifications, disruptions of the deadlines of the performance of operations and others). The cost accounting scientific and technical organization does not simply recover the expenses from a statewide fund (the budget, the unified fund for the development of science and technology and others), but sells its product for money at prices, which are formulated in accordance with established procedure, which will constitute the financial bases of the updating of the next reproduction cycle on an expanded basis.

The expenditures of the organizations before the time of the surrender of the work to the client cannot be covered by means of bank credit. Industrial enterprises and organizations, which are self-supporting, in practice cannot develop on borrowed assets as the basic source of the paying off of expenses. One of the basic principles of the cost accounting of socialist enterprises (and this has been verified by the many years of experience of their operation) is their initial provision with internal capital. With development and the increase of the efficiency of work the enterprises will carry out the expanded reproduction of their own resources by means of their own revenues.

The increase of the production capacities of enterprises, the broadening of the material and technical base of organizations and their provision with additional internal capital from centralized sources should always be regarded as the initial provision of resources with the additional plan obligations to the state, which follow from this. In the new cost accounting system this obvious requirement is not taken into account, since borrowed assets are taken as the basic source of the financing of operations prior to their completion and turning over to the client. The fact that it is practically impossible to provide immediately all organizations with internal working capital due to the lack of idle assets in the state budget, is the basic argument in favor of precisely such a solution of the problem. As a result many difficult questions (essentially irresolvable ones) arose: Where is one to find such a large amount of idle monetary assets, which it would be possible to lend to all organizations? Is it possible to withdraw them in some way for a while from the client? What organ can perform this work? Is this within the power of and is this characteristic of the State Bank? How is one to carry out the accounting and monitoring of the expenditure and return of the borrowed capital? And the most important thing is that the entire future life on credit for developing organizations seems very uncertain and extremely difficult. All independence in the disposal of working capital is lost. All the basic functions of the management of the process of financing developments

prove to be centralized and it is not known in the name of what goal. Under these conditions it is hardly possible to speak about the development of cost account and about any additional stimuli for the increase of the efficiency of scientific and technical activity.

Thus, the cost accounting organization should have its own internal working capital. It should be granted (within the framework of democratic centralism) complete independence in the disposal of this capital. This does not mean that credit as a source of the paying off of expenses does not play any role. Under specific conditions it is advisable to use it, but only as an auxiliary and temporary form of the meeting of expenses. In the new cost accounting system an attempt is made by means of the collection by the bank of higher interest for the use of credit in excess of the established planned time of the performance of the operations to solve the problem of speeding up the time of the completion of scientific and technical developments and their transfer to the client. Here the payment of higher interest should be made at the expense of the profit of the developer and, in its absence, by means of assets from the fund of the development of the organization. There is definite sense in these suggestions. However, first, the use of credit as an auxiliary source will concern a negligible amount of the developments being performed; second, the stimulating role of credit (as an auxiliary form of the meeting of expenses) is not to be compared with the powerful stimuli of the acceleration of scientific and technical progress, which are connected with the comprehensive improvement of cost accounting as the basic method of the planned management of the activity of scientific and technical organizations.

The broadening of the sphere of the use and the activation of commodity-money relations constitutes the basis of the comprehensive improvement of cost accounting as a method of the planned management of scientific and technical activity. However, in established practice commodity-money relations are not prevalent in this sphere, while wherever they are used, they are modified to such an extent that they lose their economic basis. This pertains to the physical and material evaluation and the cost evaluation of the product of scientific and technical activity, to the principles of the establishment of contract prices for developments, to the methods of the formation and the forms of the attraction of assets for the financing and stimulation of scientific and technical organizations and others and in many ways is connected with the disregard of the unity of the general methodological principles of the construction of the cost accounting mechanism of the management of production, scientific and technical activity in conformity with the unified (commodity) form of their products. The system of the buying and selling of the product of scientific labor constitutes the basis of the economic relations of scientific research institutes, design bureaus and clients. What is this product with respect to the physical and material form? How is one to evaluate its use value and cost? Only after the elaboration of these questions can one talk about the comprehensive improvement of the cost accounting mechanism of the management of scientific and technical progress as a means of achieving the socioeconomic goals of the development of society. The theoretical settlement of these questions is necessary first of all, since accuracy in the evaluations begins with the elaboration of conceptions and the specification of concepts.

What is liable to evaluation as the product of scientific and technical activity--new means and objects of labor, new technology, inventions, scientific and technical information, knowledge? For all the apparent simplicity and obviousness of the answer the confusion in the attempts at evaluating the final product of scientific and technical activity and at ascertaining its nature begins precisely here.

The perfection of the cost accounting mechanism of the management of the activity of scientific and technical organizations, which is determined by the thoroughness and consistency of the implementation of the principle of the comparison of expenditures and results, depends first of all on the correctness of the choice of the indicators of the expenditures and final product of the scientific and technical organizations in value and physical terms.

Let us examine the quite frequently encountered definition of the product of the scientific and technical organization, which, for example, we find in L. Rozhneva. The product of PNIR (applied scientific research and development), she writes, "...is scientific knowledge in the form of laws, theories and formulas, which are presented in articles, monographs, dissertations and so forth, this is also the scientific knowledge, which is materialized in objects and products, this is jobs-services. But since the basic goal of applied scientific research and development is the development of new tools and objects of labor and technological processes, the bulk of the results of applied scientific research and development appears in the form of either physical products (machine tools, instruments, devices, systems, substances) or physical processes (welding, radiation treatment, heating, hardening and other methods of working materials), which are accomplished by means of the corresponding industrial equipment. Precisely this part of the scientific product is called the commodity."[3] The author is convinced of the existence of commodity relations in applied science, but since, in her opinion, only physical products, and not their ideal reflections, can be produced and circulated as commodities, new means and objects of labor and technologies are also the product of sectorial science. Instead of studying the conditions of the conversion of the product of sectorial science into a commodity, the author attempts to fit the scientific product to the customary notion of a commodity. Moreover, here the goal of physical production and the goal of scientific and technical activity are identified. Not the creation of physical products, but the creation in the process of perceiving objects and phenomena of ideal models of new objects and tools of labor and technological processes and the checking of their correctness on prototypes as conditions of their mass copying act as the goal of the latter. It is possible, in our opinion, to speak about the physical product as the goal of scientific and technical activity only as applied to the prototype (trial batch). Bulgarian economist I. Iordanov writes in this regard: "For science itself acquired knowledge is a ready fruit, but for practice it is still the seeds."[4]

The identification of the goals of scientific and technical activity and physical production inevitably leads to the identification of the physical and material forms of their products. But these goals are different, since the product of scientific and technical activity is not new tools of labor, but new scientific and technical information, the correctness of which is

confirmed on prototypes. Why is scientific and technical information, and not inventions and scientific knowledge, the product of scientific and technical activity? Scientific and technical information is always new knowledge, which is integrated in the production process, owing to the giving to it of a documentary form. Scientific and technical information differs from knowledge by its participation of social communication--this is the same knowledge and inventions, to which a form, which ensures their use in production, is given.

Is a commodity form inherent in this product? All possible points of view--from the complete denial of commodity-money relations at individual or all stages to the recognition of their existence in all spheres of scientific and technical activity--are advanced in economic literature. From the realistic notions about the genesis of scientific and technical activity, the peculiarities and nature of its historical development the conclusion is drawn that under the conditions of the scientific and technical revolution the boundaries of physical production are expanding and sectorial science is directly intruding into it. It is turning into one of the phases of production proper, into a necessary stage of the development of the product of physical production. The interconnection of the whole and the part presumes that the relations, which exist in physical production, should also exist in its organic part--scientific and technical activity. This in no way implies an oversimplified approach, in case of which the system of economic relations, which exists in physical production, is being mechanically extended to the activity of scientific and technical organizations. The extensive use of commodity-money relations (especially in sectorial and applied science), which makes it possible to compare and to give an adequate evaluation to the expenditures and results, has turned into a most important condition of the increase of the efficiency and significance of work in this sphere.

Commodity-money relations can also be applied to a product which does not have a substantial form. This pertains to the product of power engineering, which is physical, but not substantial, to the product of freight transport, communications and others.[4] Not the physical nature of the product, but the observance of a number of conditions determines the form of existence of the product (commodity or noncommodity). These conditions are:

--the existence of the social division of labor, in case of which the product is produced not for internal consumption, but for a client;

--the exchange of labor and its products in conformity with the principle of the equivalence of labor expenditures, that is, on a compensatory basis.

In case of the observance of these conditions the product of scientific and technical activity turns into a component of the production process, into a specific type of use value, which exists in the form of the value and is alienable on the basis of the principles of buying and selling.

If we examine the product of sectorial scientific and technical organizations from this point of view, it is easy to discover that these conditions are being observed. Indeed, the intensification of the social division of labor and the specialization of production led to the separation of scientific research and development into a special type of activity, which is performed

by specialized scientific research institutes and design bureaus not for their own needs, but on the order of other organizations. This separation achieved the fullness of its expression with the extension to planning and design organizations of the Statute on the Socialist State Production Enterprise. It is obvious that this statute should also be extended to sectorial scientific research institutes, with allowance made for the conditional nature of the division of scientific and technical organizations into scientific research institutes and design bureaus, since the latter are specialized not in conformity with the principle of the stage-by-stage distribution of responsibility when solving sectorial problems (scientific research work or experimental design development), but according to the object principle, that is, depending on the direction of technology and the subsector of production.

Sectorial scientific research institutes and design bureaus transfer a large portion of their output (according to our calculations about 65 percent) to clients and interested organizations at contract prices, which take into account the individual expenditures and the impact which is guaranteed by the developers. True, direct experience of pricing does not exist in this sphere. The sale of the output of scientific and technical organizations on a compensatory basis at contract prices only with some conditionality can be interpreted as an attempt at the establishment of prices.

The estimated cost of scientific research work and experimental design development, which has been increased by the amount of the economic stimulation funds (FES), which perform the role of planned accumulations, performs the role of the planned price. The price, which has been established in this way, is a tentative estimate of the significance of the developments when concluding contracts. In the process of the series production of new tools and objects of labor a final cost estimate of scientific and technical developments as a product is made on the basis of the addition of their actual expenditures and proportionate deductions from the markups on the wholesale prices of new products or from the additional profit which was derived as a result of the assimilation of new technical processes.

The tentative cost estimate of scientific research work and experimental design development is determined according to the model:

$$P = C+V+KI, \tag{1}$$

where C is the material expenditures; V is the remuneration of labor; K is the coefficient of deductions; I is the calculated national economic impact.

The model of the final price is:

$$P = C+V+K_1A \pm \Delta(C+V), \tag{2}$$

where K_1 is the coefficient of deductions from the markups on the wholesale prices of new products or from the decrease of the product cost as a result of the assimilation of new technology; A is the amount of the markup on the wholesale price of a new product or the decrease of the product cost as a result of the assimilation of new technology; $\Delta(C+V)$ is the difference between the planned and actual expenditures on scientific research work and experimental design development.

Such an ambiguous estimate of the cost of scientific research work and experimental design development reflects the conflict of the initial methodological premises, which are the basis for it, and gives rise, in turn, to a cumbersome mechanism of economic stimulation. The point is that the deductions for the economic stimulation funds of scientific and technical organizations are made not immediately after the sale to the client of the scientific and technical documents and not from their own profit, but mainly from the profit of the introducing enterprises within 3 years from the start of the introduction of the new equipment and technology. But this period is also dragged out significantly, for example, up to 7 years. Such a gap reduces to naught the stimulating effect of the economic stimulation funds, since it is not the workers who deserve it that receive the incentive. Deductions from the profit of industrial enterprises are an unreliable source of the increase of the economic stimulation funds of scientific and technical organizations, therefore the latter form an overwhelming portion of their revenues not subject to the efficiency of the performed work, but as a result of the "saving" on estimated expenditures, which is frequently achieved by the deliberate and systematic overstatement of their planned amount in the process of concluding contracts. This is a result of the monopoly position of the developers, which enables them to maintain the planned and actual indicators and the economic stimulation funds in an invariably balanced state regardless of the end results of their activity.

To date two directions of the improvement of contract prices have formed. The first is based on the consolidation of the prevailing procedure and received procedural embodiment in the Model Contract for the Transfer by Enterprises and Organizations of Scientific and Technical Achievements to Other Enterprises and Organizations for the Provision of Assistance to Them in the Use of Adopted Advanced Know-How, which was approved in 1971 by the USSR State Committee for Science and Technology. This direction assumed the form of partial improvements of the prevailing practice of the ambiguous estimation of the cost of the final product of scientific and technical organizations. The second direction, of which the author of this article is a advocate, is based on the most complete use of the general methodological principles of pricing under the conditions of socialism as applied to the specific nature of the product of scientific and technical organizations.[6] This product is regarded as a commodity which has a use value, as which the increase of the economic efficiency of new tools and objects of labor and technologies acts, and a cost (P), the components of which are:

$$P=C+V+m, \qquad (3)$$

where m is the surplus product.

Models (1, 2, 3) of the contract prices, while not having fundamental differences in the form of the reflection of expenditures, differ radically in the principles of the calculation of the profit, since they proceed from different premises for the nature of the product of scientific and technical activity as a commodity. At the same time the form and methods of the inclusion of the profit in the contract price are of exceptionally great importance in the evaluation of completed scientific research work and experimental design development, since the stimulating effect of the price is

manifested through the profit, which turns the estimated cost of developments from an accounting unit into an active level of economic management. The procedure of including the profit in the contract price predetermines the construction of a mechanism of the economic stimulation, financing and evaluation of the activity of scientific and technical organizations.

In models (1, 2) the portion of the impact of the use of the new product, in which the given development is materialized, is understood as the profit. This is not a mandatory, but a possible component of the price, which scientific and technical organizations can obtain only after the introduction of their developments. According to this model a product, which does not have an independent physical and material form and value form and, therefore, does not enter exchange as a commodity, is created in the sphere of scientific and technical activity. But the formation and development of the aggregate worker are responsible for the indirect participation of scientific and technical personnel in the creation of the product of physical production and in the increase of its value and surplus value.

In model (3) the profit is regarded as a mandatory component of the price of the product of scientific and technical activity, which has a commodity form and exists as the value which scientific and technical organizations receive immediately after its sale to the client. The process of the generation of new knowledge and its realization in specific developments and a prototype constitute the objective basis of the formation of the profit in the contract price. The profit of scientific research institutes and design bureaus is regarded as a form of the manifestation of the value of the surplus product which was created in that sphere of activity, which depends first of all on the quantity and quality of the labor of scientific and technical personnel.

In the new cost accounting system an unsuccessful attempt is made to reconcile these opposing concepts, since, on the one hand, the actual economic impact from the introduction of new equipment and technology (K_{1A}) and, on the other, the profit included in the estimated cost of developments (KI) are taken as the basic sources of the formation of the economic stimulation funds of scientific research institutes and design bureaus. Meanwhile, experience shows that the effectiveness and economic efficiency of economic reforms are more significant, the more consistent and logically complete their theoretical and methodological bases are. The experience of the formation and use of the economic stimulation funds of scientific and technical organizations convincingly confirms the unsuitability of the conciliatory position.

First, the difference in the advantageousness of these sources from the point of view of the interests of scientific and technical organizations immediately came to light. The profit, which is included in the estimated cost of developments, is for them a more reliable source of the formation of economic stimulation funds, since for its derivation it is sufficient merely to fulfill the conditions of the contract and to turn over the scientific and technical documents to the client. For the formation of the corresponding portion of the economic stimulation funds from the actual economic impact of scientific and technical innovations it is necessary to achieve their introduction in production. Meanwhile, the organizational, material and financial prerequisites, as well as the time of their introduction depend little on the

immediate activity of scientific research institutes and design bureaus. The difference in the advantageousness of these sources predetermined the difficulties of implementing the principle, which is incorporated in the new cost accounting system, of the establishment of a close dependence of the amounts of the economic stimulation funds on the real impact in the national economy, which is obtained as a result of the introduction of new equipment and technology. For example, in the sector of heavy and transport machine building, which changed over in 1971 to the cost accounting system of the organization of work on new equipment, the deductions from the profit in the estimated cost of developments and from the actual economic impact in absolute value are nearly equal. And this is given the fact that the profit in the estimated cost is determined per year of the use of developments, while the actual economic impact is determined for the full amount of introduction.

Second, the difficulties of the practical realization of the concept of the profit of scientific and technical organizations as a part of the impact of a new product predetermined the attempt to equalize the reliability of the different sources of the formation of incentive funds by permitting the issuing of advances on developments lasting more than 3 years against the guaranteed economic impact and their subsequent deduction from the material incentive fund. The share of advances in the sources of the formation of the incentive funds of scientific and technical organizations in heavy and transport machine building came in 1972-1975 to 14.6 percent and in 1976-1980 to 10.0 percent. With allowance made for this the ratio of the sources, which are different in economic nature, of the formation of incentive funds is forming not in favor of the actual economic impact. Moreover, during these year not more than 25 percent of the received advances was register[illegible] subsequent deduction, the remainder was subsequently not deducted, causing an increase of the material incentive funds, which was not justified by the obtained end results.

Thus, the combination of essentially different interpretations of the profit of scientific research institutes and design bureaus led to the designing of a quite complex and contradictory mechanism of pricing and stimulation, the difficulties of the functioning of which stems from the need for the elimination of the theoretical and methodological errors on which it is based. However, the difficulties and shortcomings of a practical nature are not so significant as compared with the lack of conformity of the interpretation of the profit of scientific research institutes and design bureaus as a part of the impact of new equipment with the basic methodological principles of the labor theory of value. These principles are common both for physical production and for scientific and technical activity. And the modification of pricing in conformity with the specific nature of the product of this activity is advisable as long as it occurs within the framework of these principles. These principles are based on the fact that the profit has a corresponding physical equivalent and the process of production (the process of the generation of new knowledge) constitutes the basis of its formation. From this standpoint a portion of the economic impact of consumption cannot act as the profit of scientific and technical organizations. The latter should be regarded as nothing but the form of the manifestation of the value of the surplus product which is created in the sphere of scientific and technical activity.

These principles should also be made the basis of the formulation of prices for the results of scientific research, planning and planning and design work. The problem of increasing the economic responsibility of developers for the quality of the performed scientific research work and experimental design development and of determining the economic advisability of the existence of individual scientific and technical organizations can be solved only in case of the extensive dissemination of the value estimates of completed scientific research work and experimental design development.

FOOTNOTES

1. Hereinafter to shorten the presentation they will be called "scientific and technical organizations."

2. "Instructions on the Changeover of Sectorial Scientific Research, Technological and Planning and Surveying Organizations to the System of Payment for Work, Which Has Been Completely Finished and Has Been Accepted by the Client," the collection of documents "Sovershenstvovaniye khozyaystvennogo mekhanizma" [The Improvement of the Economic Mechanism], Moscow, "Pravda", 1980, pp 202-205.

3. L. Rozhneva, "The Pricing of Products of Applied Research and Development," VOPROSY EKONOMIKI, No 3, 1977, p 119.

4. I. Iordanov, "The Evaluation of the Economic Efficiency of Science," Moscow, "Progress", 1977, p 22.

5. In this regard as applied to transportation and communications K. Marx wrote: "There exist independent sectors of industry, in which the product of the process of production is not a new substantial product" (K. Marx and F. Engels, "Soch." [Works], Vol 24, p 64).

6. See, for example, V. A. Pokrovskiy, "Povysheniye effektivnosti nauchnykh issledovaniy i razrabotok" [The Increase of the Efficiency of Scientific Research and Development], Moscow, "Ekonomika", 1978, pp 180-182.

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FACILITIES AND MANPOWER

ACADEMICIAN DISCUSSES NEW GENERATION OF SCIENTISTS

Moscow IZVESTIYA in Russian 5 Aug 85 p 2

[Interview with Vice President of the USSR Academy of Sciences Academician Yevgeniy Pavlovich Velikhov by IZVESTIYA correspondent Kim Smirnov: "On the Young Sciences and the Young People in Science"]

[Text] [Question] Yevgeniy Pavlovich! It is now the Year of Youth on the planet. The 12th World Festival of Youth and Students has concluded in Moscow. Therefore it is natural to look into the future of both the young sciences, which are emerging today, and the boys and girls, who will constitute the new generation of scientists and will greet the new century during the best time of life for the obtaining of scientific results. How, in your opinion, will the map of science appear before them at that time? For the solution of what main research problems on earth, in its depths and in space must they prepare themselves already today? Would you venture to predict the birth of new sciences in the near future?

[Answer] In the West, as well as in our country from time to time forecasts appear: In what year will people land on Mars, when will cancer be conquered, when will they begin to obtain thermonuclear energy from the water of seas and oceans? The predictions of such horoscopes rarely come true. For in forecasts people usually proceed from their own current achievements, possibilities and limitations. While "the map of science," about which you are speaking, is a lively, very dynamically developing one. And it is difficult to describe accurately the contours of its "drifting continents" at the moment when the new century will begin. However, of course, it is possible to try to single out the main trends of development and the main problems, which the present young people in science will have to solve at that time.

A characteristic feature of the present is the integration of research. For example, the study of new astrophysical objects, the structure of the universe and the history of its development is closely connected with the study of the structure of matter. In both areas, which not that long ago looked like the realm of chaos, a definite order is being traced more and more clearly.

The bringing of astronomical observations into space orbits is opening up to us a different picture of the celestial sky than from the towers of

terrestrial telescopes. Previously mainly the emissions which the atmosphere let through--visible light and radio waves--were able to "sketch" this picture. But today infrared astronomy, ultraviolet, X-ray and gamma astronomy, which are discovering completely new objects--neutron stars, quasars, pulsars--already exist.

Today we know significantly more than previously about the expanding university and its dynamics. We are studying it, so to speak, from the first seconds of its expansion. It has become possible--by means of computers--to synchronize measurements at telescopes which are far removed from each other; as a result, for example, it was possible to study the movement of a balloon which was launched into the atmosphere of Venus, which helped to study its dynamics and properties; to use such detectors as, for example, Lake Baykal to detect neutrinos--particles which come to us from the depths of the universe. They bear unique information about events in the celestial world. In spite of the fact that even the earth is practically transparent for neutrinos, modern equipment is making it possible to record them with the necessary accuracy.

In short, a impressive picture is already today spreading out and by 2000 will spread out even more completely before the young people who will turn their eyes to space: from the previously inaccessible precision in the knowledge of the neighboring planets and other astronomical objects to the penetration of such depths of space, at which the speed of the expansion of the universe approaches the speed of light.

A no less impressive picture is unfolding before those who are looking into the abyss of the microcosm. Take elementary particles. All their apparent chaos reduces to an already completely ordered set of fundamental particles--quarks. We are picturing the forces, which bind these particles, significantly better than quite recently.

But whereas this very field of science to some extent is aimed already traditionally at the problems of atomic and molecular structures, the atomic nucleus and elementary particles, a completely new phenomenon has also appeared: engineering and technology rushed after physics into the microcosm. Genetic engineering and biotechnology use molecules, which carry information about life and heredity. Microelectronics operates at the micron and submicron level. As a result the continuous improvement of computer technology, the size of its memory and the possibilities of our communication with the computer is occurring.

Already today the arrays of information, with which computers deal, are comparable to large libraries. If it is a question of the computer for individual use, it is possible to put on a magnetic medium information which corresponds to hundreds of thousands of pages of test. While for the major user this is already millions of pages. Optical and laser recording is making a "memory" of tens of millions of pages quite practicable. The speeds of the processing of information are already being measured in picoseconds.

[Question] Let us remind the readers that a picosecond is a second which they have divided by 1,000,000,000,000. Light in a second could make 7.5 trips around the world. In a picosecond it would cover only 0.3 mm.

[Answer] When I was studying at the university, there were already accelerators in atomic and nuclear physics. There were large instruments in astronomy. But if you take ordinary practical physics studies, the equipment and technology of the mass experiment were quite primitive. Today they have drawn together with industrial technology.

Yes, it is very promising that biology, microelectronics and optics have moved into the microcosm. Completely unpredictable horizons are being found here. These are new worlds, unexpected and surprising ones, which are continuously, one after the other being revealed to man. And it is simply impossible to foresee or calculate into what new research directions, especially technical directions, all this will develop beyond our century.

New equipment--laser, computer and measuring--is also unfolding new possibilities before the earth sciences. We can already determine exactly the movement of continents and in general the movement of the earth's crust. We can visualize the most hard to reach depths of the planet both from its vibrations and from the propagation in the earth's crust of electromagnetic signals. Here such new powerful sources as magnetohydrodynamic generators are coming to our aid.

I have cited just one unit, in which various modern sciences, research methods and experimental equipment are connected, are interweaving, overlap and supplement each other. It is also possible to cite other examples. But each time the fact that the sciences today are developing in close connection with each other, will be obvious. Both general methodology and general technology "cement" them. The integration of the sciences is radically changing our customary notions about research. For example, the drawing is disappearing. A "data bank" and a system of the automation of design operations are appearing in its place.

I believe that now is a remarkable time in the development of science. Also for the fact that it is beginning very rapidly to influence the life of man and his entire culture. Recall the efforts which are being directed in our country at the improvement of the environment. The fundamental position, which science is now actively developing, is waste-free technologies. Waste products, as Academician B. Laskorin says, are an indicator of the backwardness of the technological process. So that it is also a question of the formation of a new technological culture.

The means, which the USSR Academy of Sciences has been testing in recent time, is affording interesting possibilities for young people. This is the combining of academic science with plant laboratories. It is the shortest route from the idea to practice. We have good relations with a number of plants. And we regard the Moscow Motor Vehicle Works imeni I. A. Likhachev as a research testing ground of the academy. One can see with one's own eyes that production is actually being transformed under the influence of science, although this is a complicated process. Young researchers are playing a decisive role in it. For example, the center of the automation of design operations at the Moscow Motor Vehicle Works imeni I. A. Likhachev consists entirely of such scientists.

[Question] The young generation of researchers and engineers can begin from higher starting points than their predecessors. It is possible to expect and demand much of it, when it is a question of speeding up the development of the country. But what main demand should it make on itself?

[Answer] First of all civic spirit, which is embodied not in lofty words, but in great professionalism. An interest in science, dedication to it--yes, of course. But on one condition: when it has been recast into real work and its results.

Many of the present managers of large research collectives during their student and graduate student years went through the quite good Komsomol school. For example, Corresponding Member of the USSR Academy of Sciences V. Pismennyy and Director of the Center of Technological Lasers of the USSR Academy of Sciences G. Abilsiitov together with their colleagues in the Physics Faculty of Moscow State University were at the source of the movement of student construction detachments.

Today the position of young people in science is no less active. The Intensification-90 Program is being implemented in Leningrad. Engineering centers are in operation in the Ukraine. In Belorussia the achievements in the development of modern technology, in optics and laser engineering are very substantial. In Lithuania there is splendid work on microelectronics. Estonian spectroscopic research is interesting. And all this to a large degree is being advanced by the young generation.

[Question] You mentioned the Estonian work. IZVESTIYA wrote about Leninist Komsomol Prize winner P. Saari. He is now the director of the Institute of Physics of the Estonian SSR Academy of Sciences, one of the youngest managers of scientific collectives in the country.

[Answer] In Estonia in general young scientists are being educated and promoted very sensibly. K. Rebane, president of the republic academy, knows how to do this.

Completely new young institutes are also emerging here. For example, the affiliate of the Institute of Problems of Cybernetics in Pereslavl-Zalesskiy. There are only young people there. Among our most urgent problems today is the development of a new industry, of which programs for computer technology will be the product. This will be, perhaps, the youngest sector not only with respect to the time of birth, but also with respect to the influx of fresh forces into it. And this will be the basis for the genuine computerization of the country.

Thus, much, very much depends on the depth and breadth of the range of vision, culture and specialized knowledge, with which young people will come to the programming industry, and not on just the desire to work in a leading detachment of scientific and technical progress. We now already have in this field many people, who understand all the subtleties of programming, and these, as a rule, are young people. But whether they will be able to turn their knowledge quickly into a product useful to society--that is what is important. In the end not only serious words, but also serious tasks and a

serious atmosphere, which requires the courage of independent decisions, educate.

Yes, the speeding up of the development of the country depends today to a significant degree on young people. On their dedication to the cause of communism. On the dedication of science. On the professional level. On their creative potentials.

[Question] But potentials are only potentials. The letters, which come to our newspaper, say that quite often the young people, who advance new ideas, do not have enough unselfish support on the part of their scientific supervisors. But they themselves in their time receive such support generously, to the full extent!

[Answer] You are hitting one of the sore spots. Of course, if it is a question of potentials, it is important how we will "unleash," reveal these potentials. No allusions to higher starting points and the greater difficulty of today's problems justify the lack of confidence and extra caution with respect to young people wherever they appear. But young people themselves also cannot wait until they roll out the red carpet to science before them. They should cultivate in themselves and display the will to resist difficulties, conservatism and the inertia of rest and the will to overcome them.

[Question] Every real scientist is a unique individual who is not like others. And still, very likely, every new generation in science has its distinctive traits, its merits and shortcomings, its life ideals and prejudices, its boldness and its caution. What new traits, which are absent or are inadequately developed in the generation of scientists who are actively working in our day, would you like to see in the young people who are going to research laboratories? What principles and traits of your scientific generation, the generation of your teachers should in no case be lost when passing the scientific baton to the future? The question of the change of generations in science, as everywhere, is difficult. But how is one when turning over to young people the workplaces and positions in laboratories and institutes not to lose not only the scientific, but also the spiritual human potential, for which domestic science was always famous? How is one to see to it that the words of the poet and front line soldier Vladimir Karpeko: "We are yielding to you not the place. We are passing to you the banner" would become not lofty words, but a fact?

[Answer] As a matter of fact, I have already begun the answer to this question. Of course, Soviet science in all generations has accumulated very important, interesting traditions. But all the same, if one speaks of my generation, we began to work at times which differed from the current times. The rapid growth of science occurred by means of the development of new directions and the opening of new institutes. Now we should ensure the acceleration of progress to a greater extent by means of qualitative, and not quantitative, growth. It is very important to retain enthusiasm, but not to give rise to infantilism and a delay with the formation of responsibility.

I am firmly convinced that both the "banner" of science and the traditions, the spirit of the leading research schools are passed on best of all in scientific collectives themselves. And here it is important that they would be not only a family in which different generations are sensibly combined. Galaxies of striking and diverse individuals are also important. It is important that dreamers and pragmatic-minded experienced workers; narrow specialists, who are absorbed in their trade, and broad-minded, widely informed people of encyclopedic knowledge; philosophers and organizers would work toward a single goal. And those who are "grounded" very well. And those who have their heads in the clouds, but see the very distant horizons.

Without such collectives, which pursue large goals, science cannot solve the key problems of the knowledge and transformation of life. And to pass on their spirit, their principles, their intellectual level--as the main spiritual precious object--from one generation of researchers to another, like a baton, like a banner--in this, perhaps, lies the greatest meaning of all our educational work with the young scientific replacement.

[Question] Under what "intellectual conditions" do young scientists have to work? At present computerization is becoming the sign of the times. But there are two polar points of view. The first: computerization, which concerned science the earliest of all, frees the mind of the scientist, the time of the scientist from a large amount of routine labor on the processing and systematization of data and thereby affords new opportunities for the more thorough comprehension of the surrounding world, for the solution of the truly main problems. The second: computerization merely gives such an opportunity; but in practice in this case "mechanization" and the narrowing of the interests of researchers for some reason are also occurring; the utilitarian principle, which makes the personality of the scientist uninspired, comes to life with the computer. What is the truth?

[Answer] This is not only a problem of science. This is a problem of all of society. The arrival of personal computers is becoming a fundamental, revolutionary feature. The computer is ceasing to be some mystery which is easily understood only by professionals. The computer is a powerful intensifier of contact. Of course, one must not idealize the computer. It will not replace a living collocutor. Nevertheless it sharply increases the active acquisition of knowledge and the mutual exchange of new information.

Must it be said what horizons this is opening before the real scientist?! But if the personality is "mechanized," the computer is not to blame. The personality is to blame. But what about the computer itself? It is a blessing. For me. For you. For man in general. For mankind. It is possible to carry everything to the point of absurdity and to use the computer to make tea on it. But no one is doing this. It has another task: to intensify mental activity. Some 80 percent of the problem of computerization consists not in the "hardware," but in what programs we will put into it. At present a resolute attempt is being made to introduce computer technology extensively in education. The Academy of Sciences here is taking an active position and is helping the Academy of Pedagogical Sciences and the Ministry of Education.

The introduction of computers in the real present-day school is not a painless process. We are beginning it before the mass production and introduction of personal computers have been set up in the country. This is right. Experience shows: if people are not ready, computers cannot improve the matter. It is a question not only of teaching man to free himself from "routine" mental work, by transferring it to computers. Not only of how to use this new friend and assistant of man for life. It is a question of the development of man, of his formation as an individual. It turns out that computers blend in a very interesting and different way with the different periods of its formation.

The matter, thus, does not reduce to mastering the techniques of programming. Far from it. To use the computer efficiently for the maintenance and development of the creative attitude of man toward nature--that is in what the essence lies. It is easier to do this by starting in early childhood, when the child is only just discovering for himself everything around himself. My and your attitude toward the world is already in many ways burdened by traditional, "precomputer" experience.

In the future, of course, such close, friendly interrelations of man with his "home" computer, the possibility of which older generations do not suspect, will form. Young people consider the computer to be alive.

Some new culture, the culture of dialogue, of contact with the computer, is emerging. And it will come into our society even not through science alone, but first of all through the system of education. Who knows, perhaps the pupil of the year 2000 first will learn to print on a computer, and then to write by hand.

Here is what I would like to say in conclusion. During the remaining years of the 20th century mankind will solve much more of what is now considered mysteries. People will begin to use to a greater degree not only the fruits of science, but also its very essence--the scientific method of thinking and cognition. And, of course, the future depends on the young people who today are entering the path of the research quest for the truth.

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FACILITIES AND MANPOWER

UKRAINIAN PARTY OFFICIAL ON ACADEMIC SCIENTIFIC CENTERS

Moscow PRAVDA in Russian 2 Jul 85 p 2

[Article by F. Rudich, chief of the Science and Educational Institutions Department of the Ukrainian CP Central Committee: "Scientific Centers of the Academy"]

[Text] Does a republic academy of sciences need regional scientific centers? A few years ago such a question aroused doubts even among several leading scientists. However, life has demonstrated with all obviousness the timeliness of the organization of these subdivisions of the Ukrainian SSR Academy of Sciences. There are now six scientific centers in the republic. Each of them encompasses by its influence a group of oblasts of the Ukraine, while kinds of affiliates--scientific coordinating councils--have in turn been formed in them. For the specific study and the search for a solution of regional problems of scientific and technical progress special scientific departments have been set up under the bureaus of the scientific centers.

The scientific centers are actively working today in the basic regions of the republic and are helping to increase the pace of the introduction of scientific and technical innovations. They have not become an additional instance between the institutes and the Presidium of the Ukrainian SSR Academy of Sciences. The scientific centers have found their place in the system of the management of scientific and technical progress as organs of interdepartmental scientific coordination in the regions and as an effective means of mobilizing the efforts of scientists and production workers for the solution of the problems of increasing the efficiency of social production, which are specific to the given territory.

By a decree of the Ukrainian CP Central Committee and the Ukrainian SSR Council of Ministers the scientific centers received the right in consultation with local organs to enlist in their work scientists and specialists of the national economy regardless of their departmental affiliation.

The party committees immediately began to actively use the rich potential of the scientific centers. The cooperation of local party organs and the academic centers when using the goal program method of the planning and organization of operations became especially effective. A set of scientific and technical programs--6 republic programs, 140 sectorial programs and more

than 100 oblast or regional programs--is being implemented in the Ukraine. The active participation of specialists of various types and departments was needed in order to carry out their skilled formulation, to link the content "vertically" (at the oblast-republic level) and to figure out the resource supply. When solving these problems at the level of oblasts the organizing possibilities of the oblast party committees, on the one hand, and the scientific and technical potential of the scientific centers, on the other, were also fully revealed.

It is also important that scientists of other regions of the republic are being enlisted by the scientific centers for the solution of the problems of individual oblasts. For example, scientific collectives of Kiev, Dnepropetrovsk, Donetsk and Kharkov are helping enterprises of Voroshilovgrad, Zhitomir and Nikolayev oblasts. The return in case of the conclusion of contracts on creative cooperation between the republic academy and the oblasts of the Ukrainian SSR is proving to be very significant. The contracts take into account the specific nature of the scientific and production potential of the oblasts and are aimed at the solution of regional problems. And, what is most important, they reflect the common concern about the retooling of production and the policy of resource conservation.

It is natural that each scientific center of the Ukrainian SSR Academy of Sciences and the oblast party and soviet organs are directing efforts first of all at the solution of scientific and technical problems in the sectors which determine the national economic specialization of the region. For example, for the Donbass this is the formulation and implementation of the Coal Program, for Dnepropetrovsk Oblast--the Steel and Ore programs, for Kharkov Oblast--the Energy and T-150 Tractor programs and so on.

In all about 1,200 assignments are being accomplished in the interests of more than 300 production organizations on the basis of contracts on scientific and technical cooperation of the Ukrainian SSR Academy of Sciences with the oblasts of the republic. Approximately half of them involve the development and introduction of advanced technologies, new types of machines, equipment and materials and automated control systems. The main emphasis here is on the more complete use of the already available scientific developments. Practical experience has shown that the instances, when for a long time production specialists "rack their brains" over problems which have been solved by scientists of the Academy of Sciences or other sectors, are still frequent.

The reason for the emergence of such situations is the low efficiency of information supply. Therefore, the scientific centers of the Ukrainian SSR Academy of Sciences have united their efforts with territorial organs of scientific and technical information. They annually compile catalogues of the scientific research operations, which have been completed in the region, and monitor the use of this "data bank."

The cooperation of party committees and scientific centers appeared most effectively, perhaps, in the performance of operations connected with the implementation of the USSR Food Program. In recent years scientists of the Ukrainian SSR Academy of Sciences have developed a number of new high-yielding strains of grain crops, winter rape, fodder beets and clover, have developed

inexpensive preservatives for the long-term storage of moist grain and developed an energy-saving technology of the production of monogranular fertilizers. A number of works were aimed at the decrease of the losses in sugar beet production. The veterinary agents, vitamin compounds, biotechnologies of obtaining nutrient yeast and other developments of scientists showed themselves to be effective. The results of many of them quickly found extensive use at kolkhozes and sovkhozes of the republic and at production enterprises first of all owing to the support of party committees.

For example, scientists of the Institute of Molecular Biology and Genetics of the Ukrainian SSR Academy of Sciences jointly with specialists of the Cherkassy State Agricultural Testing Station developed the fundamentally new corn hybrids Kollektivnyy-244 and Yubileynyy-60. As compared with the previously regionalized strains these strains with strong, nonlodging stalks increase the yield by nearly a third, it is possible to harvest them by industrial technology.

The Cherkassy Oblast Party Committee and rayon party committees evaluated the innovation and organized its extensive dissemination. In just a year these strains occupied 90 percent of the areas under corn in the oblast. This led to the increase of the gross harvest of grain corn, for example, in 1983 by 67,000 tons, the plan of seed production was fulfilled by 236 percent.

It is also possible to cite similar examples with respect to other oblasts. Thus, the Dnepropetrovsk Oblast Party Committee gave assistance to the scientific center in the introduction of the technology of obtaining whole milk substitute for the feeding of young animals. The Kiev City Party Committee took under control the assimilation of technological processes of the storage of vegetables and fruits. The party committees of Ternopol Oblast devoted much attention to the use by enterprises of the agricultural complex of the industrial technology of growing sugar beets. In all more than 150 assignments of the comprehensive plans of the scientific centers are aimed at the increase of soil fertility, the development of modern reclamation systems, the efficient use of farming lands, the development of highly productive strains of agricultural crops and other operations, which are connected with the fulfillment of the Food Program.

As in any major matter, the scientific centers of the Ukrainian SSR Academy of Sciences still have quite a few problems. One of the most important ones is personnel. The oblast party committees, for example, are correctly pointing out the shortage in regions of doctors and candidates of sciences in several specialties which govern the pace of scientific and technical progress: robotics, analytical instrument making, individual directions of physics, chemistry and biology. The scientific centers are performing work on the correction of the situation. Apparently, the republic and union ministries of higher and secondary specialized education should promptly take these needs into account and without delay, starting already next year, reinforce the regions of the republic and the country with young specialists of these types.

The mechanism of the contact of academic institutions, higher educational institutions and sectorial scientific research institutes with production also requires further improvement. The question of the development of the pilot

experimental and laboratory base of science, the improvement of its material and technical supply and its furnishing with modern instruments and equipment is urgent. Computer technology and the means of automating the scientific experiment are not being used efficiently enough. All this is also a subject of the constant concern of the scientific centers of the Ukrainian SSR Academy of Sciences.

As a whole their establishment was an important stage in the implementation of the large-scale experiment on the formation of a system of the management of scientific and technical progress, which has been conducted in recent years in the Ukrainian SSR. The scientific centers owing to party concern and support are helping more and more actively to accomplish in the republic the tasks which were posed at the April (1985) CPSU Central Committee Plenum and at the recent conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress.

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FACILITIES AND MANPOWER

SPECIALIZED RESEARCH INSTITUTES AT UNIVERSITIES URGED

Moscow IZVESTIYA in Russian 13 Jul 85 p 2

[Article by Academician of the Armenian SSR Academy of Sciences S. Ambartsumyan, rector of Yerevan State University and deputy of the USSR Supreme Soviet: "The Order of the Plant to the Higher Educational Institution"]

[Text] The science of higher educational institutions is playing an important role in the implementation of the policy of the rapid pace of scientific and technical progress. This is a large force, if one knows how to manage it efficiently. One of the largest centers of the training of young people is Yerevan State University. Several subdivisions, which are aimed at the solution of applied problems, have been organized here. In particular, the large Research Institute of the Physics of Condensed Media.

The principle of narrow specialization was made the basis of the new scientific subdivision. Work is performed strictly in the directions which are connected with lasers, laser crystals and the interaction of laser radiation with matter. This determined the close cooperation with the Chair of the Growth of Crystals and Quantum Electronics. An integral and very important part of the scientific research institute is the special design bureau. It operates on an economic contractual basis. Each department of the institute has a laboratory of experimental and theoretical research and divisions of electronics and designing.

When fulfilling course and graduation projects the students are given specific practical themes. More than 300 such projects, which were fulfilled at the Scientific Research Institute of the Physics of Condensed Media, have already been used in experimental design developments. The upperclassmen take a direct part in the development of new scientific directions, which are being carried out in the problem laboratory jointly with the Yerevan Plant of Chemical Reagents.

The sectorial laboratory of X-ray research also operates according to approximately the same arrangement at the university. A two-crystal X-ray diffraction camera and other unique instruments and equipment were developed here jointly with the Chair of Solid-State Physics. We do not doubt that, having united the sectorial laboratory and the problem laboratories for X-ray

research, we will be able in the immediate future to establish a one-theme scientific research institute with a unique theme.

Our experience shows that the organization of university scientific research institutes with a unified consolidated theme is undoubtedly justified. It seems that it is expedient for the USSR Ministry of Higher and Secondary Specialized Education and the State Committee for Science and Technology to consider the question of establishing one-problem scientific research institutes at other universities of the country as well.

It must nevertheless be said that the scientific potential of higher educational institutions for the present is being utilized poorly. This was justly spoken about at the June conference in the CPSU Central Committee on the acceleration of scientific and technical progress. What is checking the development of the science of higher educational institutions? I will take the liberty to state several opinions. Basic scientific research at higher educational institutions is financed through the state budget. This is extremely insufficient for the performance of work at a modern level.

The situation is strange: 40 percent of the scientists work at higher educational institutions, while the amount of financing of their research does not exceed 5-7 percent of the total amount. It is necessary to set up at the leading universities and higher educational institutions of the country a carryover fund for the financing of basic research by means of deductions of 5-10 percent from the total amount of the economic contractual work of the given higher educational institute or university.

The sectorial scientific research institutes and enterprises, with which economic contracts are concluded, should be not in the least less interested than us in the basic scientific reserve of higher educational institutions. In exactly the same way as in questions of the introduction in the national economy of completed jobs. Unfortunately, in practice we very often are faced with the inadequate interest (I will not be afraid to say the irresponsibility!) of both individual ministries and enterprises. Practical experience shows: clients nearly always drag out for years the introduction of received jobs, which were financed by the state budget, and economic contractual jobs.

And there is another question which must also be discussed, without evading the urgency of raising it. This is the problem of continuity. Everyone is talking about the need for the influx of talented young people into the sphere of scientific activity and the activity of higher educational institutions, at the same time the obvious decrease of the former rush of young people into science has been noticed in recent years. I find it difficult to give an exhaustive explanation of such a trend. I will speak merely about what is contributing to it.

The wage of young scientists is low. Moreover, young people wait a long time for available vacancies. For the solution of this problem it is important to change the system of the retirement security of workers of higher educational institutions. I propose to consider the question of their retirement after reaching a certain age with the right to work for half the rate in the

positions of professor, docent or senior scientific associate without the limitation of the total wage. Having acted in that way, we will facilitate the advancement of talented young people. And, moreover, we will not lose the representatives of the older generation of scientists, whose thorough knowledge and great experience are so necessary to the higher school.

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FACILITIES AND MANPOWER

LABORATORY FOR NEW EQUIPMENT AT ZAPOROZHYE ALUMINUM PLANT

Kiev PRAVDA UKRAINY in Russian 5 Jul 85 p 2

[Article by Candidate of Economic Sciences A. Tkachenko (Zaporozhye): "Speeding Up Introduction"]

[Text] The extensive use of inventions is a direct means to the accomplishment of the most important task which was posed by the April (1985) CPSU Central Committee Plenum--to achieve the retooling of all sectors of the economy on the basis of the modern achievements of science and technology, which are capable of increasing labor productivity by many times. But how is the time of the introduction of inventions and efficiency proposals to be shortened?

At the aluminum plant in Zaporozhye they set up for this purpose a laboratory for new equipment. A design group and an experimental workshop for the production of prototypes, which is supplied with a complete set of the necessary equipment, belong to it. They invited to the laboratory the best designers of the enterprise and highly skilled workers. It operates on the basis of long-term annual and quarterly plans, which are approved by the technical council of the enterprise. The two sections of the plan include planning and design operations and the operations of the experimental workshop. The assignment, which has been issued by the client shop, is the basis of planning in this case.

By common efforts it was possible to mechanize the labor of workers of the main specialties--electrolyzers, anodizers, smelters and instrument control men. Then attention was focused on the ancillary services and shops. Now at the enterprise 97 percent of the freight is already being handled without the use of manual labor. Skilled craftsmen of the plant developed an electric loader, an electric railroad car pusher, metal pallets for refractory materials and so forth. The productivity in these operations increased by 2.5-fold. The layovers of railroad cars were decreased to one-fourth, the smooth delivery to the works of raw materials and materials was ensured.

The laboratory for new equipment constantly relies on the innovative research of plant workers and helps them with advice and in practice. Owing to this I. Maksishko, the leader of a brigade of mechanics of the railroad shop, submitted more than 200 valuable proposals, the majority of them have been

introduced. V. Benderskiy, a mechanic of the shop of electrothermal silumin and silicon, Honored Inventor of the Ukrainian SSR D. Linnik, M. Klimenko and M. Yarmak, mechanics of the railroad shop, P. Kulik, an auto mechanic of the transportation shop, and others proposed many interesting and useful innovations. As a result the enterprise in less than 4 years successfully fulfilled the socialist obligations on the creation of the efficiency fund of the 11th Five-Year Plan.

It must be said that the establishment of the laboratory for new equipment, which became a genuine center of creativity at the enterprise, stimulated research work and made it possible to give inventing and efficiency promotion a goal-oriented nature. In particular, the competition of young innovators of the enterprise--"Your First Efficiency Proposal"--went off successfully in the collective. In all 100 boys and girls took part in it, they submitted 127 proposals, 92 of which were used in production.

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FACILITIES AND MANPOWER

LITHUANIAN ACADEMY OF SCIENCES ELECTS NEW MEMBERS

Vilnius SOVETSKAYA LITVA in Russian 29 Jun 85 p 3

[Article (ELTA): "The Elections in the Lithuanian SSR Academy of Sciences"]

[Text] The session of the General Assembly of the Lithuanian SSR Academy of Sciences took place on 27 June. President of the Lithuanian SSR Academy of Sciences Academician Yu. Pozhela opened it.

New full members and corresponding members of the academy were elected at the session.

There were elected as full members of the Lithuanian SSR Academy of Sciences:

Doctor of Physical Mathematical Sciences Professor E. Vilkas, director of the Institute of Economics of the Lithuanian SSR Academy of Sciences (mathematics, applied mathematics); Doctor of Physical Mathematical Sciences Professor A. Shileyka, director of the Institute of Semiconductor Physics of the Lithuanian SSR Academy of Sciences (physics); Doctor of Technical Sciences Professor A. Chiras, rector of the Vilnius Construction Engineering Institute (construction mechanics); and Doctor of Philological Sciences I. Lankutis, director of the Institute of Lithuanian Language and Literature of the Lithuanian SSR Academy of Sciences (Lithuanian literature).

There were elected as corresponding members:

Doctor of Physical Mathematical Sciences Professor Z. Rudzikas, deputy director of the Institute of Physics of the Lithuanian SSR Academy of Sciences (theoretical physics); Doctor of Physical Mathematical Sciences Professor I.-V. Vaytkus, chief of the Chair of Semiconductor Physics of Vilnius University imeni V. Kapsukas; Doctor of Technical Sciences Professor V. Domarkas, rector of Kaunas Polytechnical Institute imeni Antanas Snechkus (radio electronics, ultrasonic engineering); Doctor of Technical Sciences Professor Yu. Vilemas, director of the Institute of Physical Technical Problems of Power Engineering of the Lithuanian SSR Academy of Sciences (power engineering); Doctor of Biological Sciences Professor A. Prashkyavichyus, rector of Kaunas Medical Institute (physiology, biochemistry); Doctor of Biological Sciences Professor M. Strukchinskas, chief of the Laboratory of Phytopathogenic Microorganisms of the Institute of Botany of the Lithuanian

SSR Academy of Sciences (biology); Doctor of Agricultural Sciences Professor L. Kadzhyulis, chief of the Department of Grass Growing of the Lithuanian Scientific Research Institute of Agriculture (plant growing); Doctor of Philosophical Sciences Professor Ya. Minkyavichyus, chief of the Chair of Philosophy of the Lithuanian SSR Academy of Sciences (philosophy); and Doctor of Historical Sciences Professor K. Navitskas, chief of the Chair of History of the CPSU of Vilnius University imeni V. Kapsukas (history).

There are now 27 full members and 36 corresponding members in the Lithuanian SSR Academy of Sciences.

Secretary of the Lithuanian CP Central Committee L. Shepetis addressed the session. Deputy Chairman of the republic Council of Ministers A. Chesnavichus and Deputy Chief of the Science and Educational Institutions Department of the Lithuanian CP Central Committee S. Imbrasas took part in it.

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FACILITIES AND MANPOWER

ESTONIAN INVENTORS, EFFICIENCY EXPERTS GET NEW HEADQUARTERS

Tallinn SOVETSKAYA ESTONIYA in Russian 26 Jun 85 p 3

[Article (ETA): "For Innovators Their Own House"]

[Text] Henceforth the Estonian Republic Council of the All-Union Society of Inventors and Efficiency Experts has not only a new address, but also its own house. It is quartered in the old section of Tallinn on Ulitsa Lay, 7, in a restored building. The Tallinn City Council of the All-Union Society of Inventors and Efficiency Experts and the United Council of the All-Union Society of Inventors and Efficiency Experts for Agriculture are also located in it. Here consultations on questions of invention law will be given for innovators, who are workers and engineers, and the personnel of technical services, a club of inventors and efficiency experts, a section of patent scientists and two faculties of the Tallinn Institute of Patent Science are operating. A school of young management personnel is in session on Fridays.

At the solemn opening of the House of Inventors and Efficiency Experts, which took place on 25 June in Tallinn, Member of the Buro of the Estonian CP Central Committee and Chairman of the Estonian Republic Council of Trade Unions N. Yuganson delivered the welcoming speech and cut the red ribbon.

Chief of the Industry Department of the Estonian CP Central Committee K. Benno, Chairman of the Central Council of the All-Union Society of Inventors and Efficiency Experts Ye. Tyurin, Deputy Chairman of the USSR State Committee for Science and Technology B. Kurakin, Chairman of the Estonian Republic Council of the All-Union Society of Inventors and Efficiency Experts G. Melits and Secretary of the Estonian SSR Council of Trade Unions L. Veskimyae took part in the solemn opening.

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FACILITIES AND MANPOWER

ENGINEERING CENTERS OF UKRAINIAN ACADEMY OF SCIENCES

Moscow SOVETSKAYA ROSSIYA in Russian 12 Jul 85 p 3

[Article by Aleksandr Nemov: "Scientific Acceleration"]

[Text] At the recent conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress the experience of the organization within the USSR Academy of Sciences of comprehensive intersectorial scientific and technical complexes similar to the Institute of Electric Welding imeni Ye. O. Paton received a high rating. Such centers are becoming the main organizations, which coordinate basic research and all the work in the most important intersectorial scientific and technical directions. Observations show that within them it is advisable to have design bureaus, planning organizations and pilot enterprises.

The addition of the forces of scientists and production workers contrary to the laws of arithmetic is not a sum, but a product. Everyone gains, and by several fold. Both the sectors, which cannot introduce so rapidly and efficiently new technological processes, and science, which obtains testing grounds for research, assets for equipment. And the state as a whole: the more developments there are, the more extensive introduction is.

All this will make it possible to make a significant contribution to the solution of the problem of changing the economy of the country over to the path of intensive development. Today the work, which is being performed at the Academy of Sciences of the Ukraine, and the activity of the party organizations of the republic in this area will also be discussed.

Inventions Are on the Conveyor

This trend appeared especially distinctly at the turn between the 1950's and 1960's. Scientists of the Ukraine turned to face practice. One can see this well from the example of one of the academic institutes, namely the Institute

of Electric Welding. Here is just a short list of the operations of recent years.

Fundamentally new technologies of welding, which are based on the use of electric beams and arc plasma, high frequency currents (and with time also the laser), friction and explosion, were delivered to production. In essence, welding became an important independent direction in science and practice. A fundamentally new technique--electroslag welding, which produced a radical, revolutionary change in the technology of the processes of heavy machine building--was also developed under the supervision of Academician B. Paton.

The work with extreme attention to the needs of practice yielded its results. The developments of the institute are waited for impatiently at the most different enterprises. The "file" of orders of the scientific and technical complex is always full. It turned out that, in general, the academic institute is today closer to industry than other sectorial institutes. And here it has retained the most advanced positions in the world in the area of basic research on electric welding, its applications and special electrometallurgy. Gradually, day by day, in familiarizing myself with the work of the institute and its associates, I attempted to understand the reasons for this. The scientific secretary of the institute, V. N. Bernadskiy, was my guide.

The conference hall is on the second floor of the oldest (in the past also the only) building. There are about 100 people in the hall. In addition to members of the scientific council, there are scientific associates, engineers of the institute and representatives of enterprises. Degree seeker Yu. P. Barvinko is defending his dissertation for the title of candidate of technical sciences.

I notice that in one of the first rows, somewhere near the side, Academician B. Ye. Paton, director of the institute, is also sitting (which is not at all typical of a candidate's defense, say, of an academic institute of the capital).

They listen attentively to Barvinko. And now the moment comes when the "strength" of the submitted work and, incidentally, of the degree seeker himself is checked. A hail of questions rains down, and the essence of the work is lit up very brightly.

The point is that in modern gas pipelines the gas is pumped under high pressure. It happens that the pipes do not stand up. The problem of localizing a rupture, if it has occurred, arises. In many countries they are combating this phenomenon: they are using for the production of pipes highly ductile and, hence, more expensive brands of steel. In Kiev they have headed in a different direction. They have proposed to put special grooves on the middle layers of the multilayer inserts of pipelines. As soon as a crack reaches the groove, it halts its growth. Is it simple? Yes, it is simple. Someone will even object--this is an ordinary invention, what does the dissertation have to do with it here? At some design bureau they did not go, perhaps, farther than an invention. But at the Institute of Electric Welding the result, which is important for practice, with an economic impact of many

thousands of rubles, was obtained on the basis of serious theoretical and experimental research. If you wish, this research is favorable ground on which not one, but several inventions will arise. Like a chain: one after the other.

Thus, science is interacting in close contact with practice. But does this not simplify the scientific results? Does it not make the return from them momentary, on the spot? But science should look to the future and work with a time lead. I will not conceal the fact that there are among our scientists such ones who look at the experience of the Academy of Sciences of the Ukraine a little condescendingly: "It is not the business, they say, for scientists of academic persuasion to 'break through' innovations. Given such an approach basic science suffers." It is in no way possible to agree with this. True theory and practice do not compete. And in order to prove this, let us set off to the pilot plant.

At the shop of electroslag technology there are not the unbearable heat, noise and gas pollution, which are customary for metallurgical production.

Candidate of Technical Sciences Yuriy Pavlovich Shtanko, a senior scientific associate, pushes buttons on the panel and pours the molten metal into a mold. In green overalls he is more like a worker than a scientist.

The smelting is completed.

Academician of the Ukrainian SSR Academy of Sciences B. I. Medovar, winner of the Lenin and USSR State Prizes, relates:

"The new sector of metallurgy--special metallurgy--appeared at the boundary between theory and practice. Electroslag technology is its basis. An important practical problem--the welding of blanks of large sections by the electroslag method--was solved first. Already in the later 1950's the method, which was developed by a group of scientists headed by Academician B. Ye. Paton, had become widespread throughout the world. Moreover, upon analysis it turned out that the quality of the metal of the weld is even higher than that of weldable parts. This was already a small task for theorists. When the process found its explanation, the idea arose to obtain by means of the new technological process metal with higher indicators."

Thus science moved practice ahead.

Today tens of countries have purchased licenses for the new technology.

The Opinion of President of the Ukrainian SSR Academy of Sciences Academician Boris Yevgenyevich Paton:

"It is not surprising that even the most developed states, when it is a question of solving major scientific problems, are forced to consider the limitedness of the financial, manpower and material resources which can be allocated for these purposes. Under these conditions the questions of the organization of scientific research and its coordination on the scale of the entire country and even several countries are assuming the greatest

importance, the need for the carefully weighed, thoroughly checked choice of the most promising directions of scientific research, specific problems and the means of their solution and for the strengthening of the contacts with practice is becoming more urgent.

"At present the development of basic and applied research is proceeding in close interconnection. The processes of the 'fundamentalization' of applied research and at the same time of the goal-oriented penetration of basic research into such fields of knowledge, which are most necessary for practice, are becoming more and more distinct. The latter is objectively leading to the emergence of research of the fundamentally new class--basic in its nature, but aimed at the solution of specific problems of great national economic importance."

Three Steps Toward Practice

To start with a little history.

In Sweden specialists of the Institute of Electric Welding imeni Ye. O. Paton carried out, in accordance with contracts, the transfer of the Soviet technology of electroslag refining to a well-known concern. Information on this leaked out to the press. Other firms also took an interest in the new miracle process. Among them (let us name it arbitrarily) is ALFA. Its representatives called on our specialists and asked them to specify whether it is possible by means of the new technology to simplify the production of crankshafts for ship engines, it is such labor-consuming work. The crankshaft, it happens, weighs up to 100 tons. And a letter with drawings of the required parts dashed off to the Ukraine, to Kiev.

The research at the Institute of Electric Welding answered this question affirmatively. But the scientists, before looking after the foreign firm, decided to make their own contribution to our, Soviet industry. They began to seek enterprises which needed such technology. The Bryansk Machine Building Plant imeni 50-letiya SSSR, where they made diesel engines for ships in accordance with a foreign license, and by the traditional, old method, proved to be it.

Doctor of Technical Sciences Georgiy Aleksandrovich Boyko, winner of the Ukrainian SSR State Prize, relates:

"After visiting Bryansk, we began to draw up a plan of the output of crankshafts in accordance with the new technology. We understood, of course, that at a machine building plant there is continuous production, that is, a rigid plan. And we do not have the opportunity to experiment, to shut down the shops. Therefore we immediately 'fit' the equipment used in the plan to the specific features of the plant, taking into account its power capacities, the height of the shops. But this is also not everything. We produced a pilot plant and after its installation by our specialists began to instruct the workers of the plant in using it. The first crankshaft, which was cast in accordance with the new system, became the best propaganda for advanced equipment. Now all the crankshafts are being produced in accordance with our technology."

The scientists needed allies in the retooling of the plant. Of course, people, who take the most advanced equipment to heart, will be found at any enterprise. It was also the task of the associates of the scientific and technical complex to find them at the Bryansk Plant. Lev Vasilyevich Popov, chief engineer of the plant, was in charge of the group of enthusiasts. He "aroused" the creative potential of the engineering and technical staff of the Bryansk Plant.

And that seems to be it. There is no secret in the Kievan acceleration of introduction. And all the same let us try to look a little more closely at it.

It is worth directing attention even to the new name of the Institute of Electric Welding: the Scientific and Technical Complex. That is, a set of subdivisions. Some of which "give birth" to an idea, others put a real technological base under it, still others produce prototypes. You will agree that it is one thing to offer an enterprise new technology, a kind of "cat in the bag," and another thing to show the pilot plant, to demonstrate how the production of output will occur. But this is only the first step. At the Academy of Sciences of the Ukraine they came to the conclusion that it is necessary to go farther. Problem-oriented cost accounting subdivisions, which are called upon to bring new developments up to practical implementation and which are now called "engineering centers," were formed on the basis of powerful scientific and technical complexes, such as the Institute of Electric Welding, the Institute of Cybernetics and the Institute of Superhard Materials.

The engineering centers completely conform to their name. They consist of design and technological divisions. From 50 to 250 associates work at them. In addition to the director there is also a scientific supervisor of the engineering center. Today there are eight such centers at the Ukrainian SSR Academy of Sciences.

Candidate of Technical Sciences V. G. Krivenko, director of the Engineering Center of Pressure Welding, says:

"The center not only produces prototypes and takes part in the retooling of shops for the series output of new products, but also retrains personnel for using the new equipment. This is also an important activity of the center."

Further we descend with Valeriy Georgiyevich to the laboratory. And there I make the acquaintance of Lenin Prize winner S. A. Solodovnikov, chief of the brigade for the introduction of pipe welding complexes of the engineering center, and USSR State Prize winner B. P. Diduk, leader of a brigade of the resistance welding complex (the USSR Ministry of Construction of Petroleum and Gas Industry Enterprises).

The former of them lives in Kiev. The latter lives in Nadym. But during the year they see each other for several months. They have a common concern--the Sever-1. The automatic welding unit is called precisely that. And now Boris Pavlovich Diduk has come to Kiev to a seminar for the exchange of experience. He relates:

"How did we manually weld pipes 1.5 m in diameter? Two men make the weld from the top, two others from below, while lying on the ground under the raised pipes. But it is possible to perform operations in the tundra only in winter, when the swamps freeze. Imagine that it is 30-35 degrees below zero, and you cannot stir--the joint should be ideally uniform. But if a blizzard accompanied by ground wind starts, it is totally impossible to work. In 2-3 years a welder gets radiculitis. But what is the Sever-1 complex? The operator stands at a console and pushes buttons. This is first. Second, whereas a welder accounts for one joint a shift, the complex welds six of them an hour."

It is possible to illustrate the words of Boris Pavlovich as follows: the impact from the introduction of the Sever-1 already comes to hundreds of thousands of rubles.

The sector won, but what about Diduk himself?

The previously best welder in the sector, in using modern equipment today, earns two-fifths as much. But he is not complaining. He believes that the new equipment is worth even such sacrifices.

The engineering centers are giving practice much, what good will they do science?

First, the centers relieve scientists of many troublesome matters with introduction and transfer them to those who should deal with this--engineers, designers, process engineers. Researchers are working more and more for the future. Second, the centers ensure effective feedback with production and make it possible to carry out the experimental checking of scientific ideas, which, incidentally, often come to light precisely in practice.

The engineering centers are also concerned today with such an important problem as the large-scale introduction of new equipment. For today 80 percent of the new developments are introduced at only 1 enterprise, 20 percent--at 3-4 and only 0.6 percent--at 5 and more enterprises.

The centers are also called upon to make a kind of appraisal in the area of introduction. Enterprises often take up any developments, if only to tick off--"automated," "robotized." But the economic inadvisability of introduction may be behind this. It is necessary to combat this resolutely. Now the center makes the economic appraisal.

"Is it probably naive to assume that everything is going smoothly in the formation of new scientific subdivisions?"

Corresponding Member of the Ukrainian SSR Academy of Sciences S. I. Kuchuk-Yatsenko, scientific supervisor of the Engineering Center of Pressure Welding and Lenin Prize winner, relates:

"There are, of course, enough problems. The main one is that the engineering centers have already passed 'the test of practice,' but, in spite of support on the part of the State Committee for Science and Technology, due to the

incomprehensible position of the Ministry of Finance and the USSR State Committee for Labor and Social Problems have still not been officially recognized. This does not enable us to realize the very important principles which were incorporated when organizing the centers. For example, we had planned to establish for design engineers, leading and senior engineers, who are directly engaged in the development and introduction of new highly efficiency equipment and technology, salary increments for high skills for the period of the planned time of the performance of the work. The amounts of these increments would be determined with allowance made for the personal contribution of each worker to development and introduction. It is also necessary to think about the remuneration of the labor of the director of the engineering center. For very great demands are made on him: he should be both a scientist and an experienced worker."

The Opinion of Academician B. Ye. Paton:

"The system of introduction, which objectively is mainly oriented toward the improvement of operating works, cannot always ensure the mass realization of scientific developments in equipment and technology. Therefore, there also arose the need for the establishment of engineering centers as special organizational forms, which conform to the difficulty and scale of the problems of introduction and ensure the engineering and technical embodiment of truly innovative achievements.

"The establishment of centers usually becomes necessary when goal-oriented basic research has already led to specific results of great practical importance and when their implementation is not supported technologically and technically by operating production and the corresponding staffs of specialists are lacking.

"Engineering centers can be established only at those institutes which have a sufficiently developed pilot production base."

When the Director Is Learning

The psychology of some economic managers and representatives of ministries and departments at times changes more slowly than that of scientists and researchers at institutes and workers and engineers at a works. Is it possible to change this situation?

In January 1985 the Kiev City Party Committee jointly with the Ukrainian SSR Academy of Sciences held the seminar "Engineering Centers Are an Effective Form of the Contact of Science and Production" with the participation of workers of the largest enterprises and construction organizations of the city.

Before the start of the meeting each participant received a questionnaire. I, perhaps, will single out the following item in it. "What problems do you want to solve with the assistance of the engineering centers?..."

This seems a little naive--a plant director came to the seminar, they dumped on him a heap of information on the achievements of science. What will he

derive of use for himself from the discussion? Will he be able to set a task for scientists and establish close contact with them?

Doctor of Technical Sciences Boris Sergeyevich Stogniy, chief of the Scientific Organization Department of the Ukrainian SSR Academy of Sciences, relates:

"When preparing the seminar the city party committee immediately selected its practical orientation. The managers of enterprises came to it not between current matters, but prepared for a serious discussion. And whereas the first part of the seminar consisted of speeches of the directors of the engineering centers, the second part was more practical--the production workers visited the base of the centers--pilot plants and design bureaus. They gave them the opportunity, as they say, also to touch the new equipment with their hands. Tens of contracts between enterprises and the engineering centers were the practical result of the seminar."

"Several months have passed. Are there already, perhaps, implemented contracts?"

"The Engineering Center of Explosive Metal Working (the Institute of Electric Welding) concluded an economic contract with the enterprises of the Kiev City Soviet Executive Committee for the operation of water supply systems for the performance of work on the development of the technological processes and the drawing up of the technical specifications for the explosive cutting in of taps into operating water pipelines. I will note: the scientists proposed a method, when even the cutting off of the water in the network in case of the performance of such work is not required. Six 'cuttings in' have already been accomplished."

"What, in your opinion, ensures the effectiveness of measures on the acceleration of scientific and technical progress, say, on the basis of the example of your seminar?"

"The most extensive participation in it of the party aktiv. You have yourself gone through the questionnaires of the participants."

Indeed, among the questionnaires there are also ones which were filled out by the secretaries of the rayon party committees of Kiev. Secretary of the Oktyabrskiy Rayon Committee V. N. Derkach wrote about the tasks, which he would like to set for scientists: "The significant decrease of the use of manual labor at the enterprises of the rayon...."

It is difficult to change the psychology of some economic managers. Here you will not get things moving by persuasion alone. Councils for the promotion of scientific and technical progress have been organized in the Ukraine under the oblast party committees. The Council for Promotion attached to the Ukrainian CP Central Committee carries out the overall coordination of operations in the republic.

In the Ukrainian CP Central Committee I carefully familiarized myself with the experience of the work of the councils for the promotion of scientific and

technical progress. The person I am talking to is Gennadiy Innokentyevich Palshin, chief of a sector of the Science and Educational Institutions Department:

"Life itself dictated the appearance of the councils for promotion. At the turn of the 1970's a difficult situation had formed in a number of sectors, especially in the coal industry and ferrous metallurgy. For example, the Donbass--an old developed industrial region--produces an enormous number of products. However, for a number of reasons, and first of all in connection with the miscalculations in the implementation of the investment and structural policy of the development of sectors, the fixed production capital of enterprises of the region became significantly obsolete.

"The time came when it was no longer possible to tolerate such a situation. But you will not get the flywheel of the modernization of scientific and technical retooling going in 1 minute. The breaking of old notions and the overcoming of inertia and departmental isolation were required. And here one could not do without party influence and authority. The council for the promotion of scientific and technical progress was set up under the oblast party committee.

"For the purpose of increasing party influence on the implementation of the unified scientific and technical policy of the solution of regional problems of a multisectorial nature councils for promotion were organized under other oblast party committees and the Kiev City Party Committee. It was decided to generalize their experience, to organize coordination and to identify the positive things which they are giving. After this the Council for the Promotion of Scientific and Technical Progress attached to the Ukrainian CP Central Committee was set up. Party and soviet workers and managers of large enterprises and scientific institutions were members of it. Member of the Politburo of the CPSU Central Committee and First Secretary of the Ukrainian CP Central Committee V. V. Shcherbitskiy headed the council.

"With what did the council deal? First, it generalized the experience of the work of the council for promotion of the Dnepropetrovsk Oblast Party Committee. This gave a new stimulus to the good initiative and indicated the means of work of the party committees in this direction. Second, the council dealt with the thorough study of the urgent, key problems of increasing the efficiency of social production. The situation with the decrease of the materials-output ratio in capital construction and with the introduction of waste-free technologies in the sectors of the food industry was analyzed at its meetings. The recommendations of the council were sent to the party committees, ministries and departments of the republic."

"What of interest, in your opinion, did the experience of the work of the councils for promotion show?"

"The thinking of the party worker changed. He became a bearer of ideas of scientific and technical progress. He is setting the tone. This is especially important if you consider that economic managers often act with extreme attention to party organs. If you wish, today the acceleration of scientific and technical progress has become a party assignment. And the

party committees are holding strictly accountable those who work not in the spirit of the requirements of the day."

The Opinion of Academician B. Ye. Paton:

"The work on the improvement of the activity of all the links of the 'science-production' chain is continuing.

"We have overcome many difficulties, in the future, apparently, we will also not avoid them. But the dialectics of the development of society also requires the struggle of the new with the old, the progressive with the already obsolete. And it is necessary to sense the responsibility of the times--to be in the front line."

Aleksandr Nemov prepared the publication.

From the editorial office:

The experience of the work of the Kievans shows what enormous possibilities are incorporated in the complex intersectorial scientific and technical centers. Such centers are a special form of the development of science, which is closely connected with life and responds promptly to the demands of production. Not by chance was it stressed at the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress that the gained positive experience must be used actively. This is one of the most important tasks, which faces the scientific organizations of the RSFSR.

7807
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FACILITIES AND MANPOWER

RETOOLING, RENOVATION OF VILNIUS PLANT OF PLASTIC ITEMS

Moscow SOTSIALISTICHESKIY TRUD in Russian No 4, Apr 85 pp 16-19

[Article by Candidate of Economic Sciences V. Bernatonis, deputy director of the Vilnius Plant of Plastic Items, winner of the USSR and Lithuanian SSR State Prizes: "On the Basis of Retooling"]

[Text] The collective of our plant is well aware that at the present stage it is impossible to settle the questions of the perfection of the organization of labor and the improvement of its conditions and to solve social problems in isolation of the development of technology.

The plant is a comparatively young enterprise, which produces more than 600 descriptions of products. It was built in the 1960's in accordance with standard plans, which by that time already lagged behind the requirements of the times. With the expansion of production and the increase of the number of personnel the imperfection of the plans began to check the further development of the enterprise. The inefficient arrangement of the equipment in the shops did not make it possible to completely mechanize and automate the basic production processes, as well as transportation and loading and unloading operations and to eliminate difficult and monotonous manual labor. The equipment and processes, which create increased noise and involve the separation of harmful substances, were not isolated. The service facilities and dining rooms did not meet the increase public health and esthetic requirements. As a result the plant coped with difficulty with the production assignments.

The administration and public organizations in the early 1970's planned during the next 15-20 years to change the situation. A special program, by which it was envisaged to transform the plant into an enterprise of high standards of production, was drawn up. The Institute of Sociology, Philosophy and Law of the Lithuanian SSR Academy of Sciences conducted special studies and periodic surveys of the workers. With allowance made for their results measures were elaborated, which were then included in the plans of the socioeconomic development of the collective, of which the complete renovation of the plant became the basis, and it had to be completed on its own under the conditions of operating production.

Tool making became the first object. Here all the operations on renovation were entrusted by the management of the enterprise to a creative group headed by the chief of the shop. Tool making is characterized by a large range of machine tool attachments, which stems from the wide assortment of products which are produced in small batches. This complicates the mechanization and automation of technological processes, and in case of the increase of the production volumes the labor intensiveness increases significantly, which influences the quality of the attachments and, in the end, the items of basic production.

It was envisaged by renovation to carry out the retooling of the shop and to improve the organization of production, labor and management. The implemented technical measures made it possible to arrange the equipment by types and technological features with allowance made for the sequence of operations. Owing to the introduction of new advanced technological processes the material and labor expenditures were reduced. In place of machining and hand finishing they introduced the cold and semihot extrusion of the working parts of attachments and electroerosion machining. Manual fitting operations were also mechanized, the tolerances were reduced owing to the establishment of a roughing section and so on. The organization of the technological flow made it possible to decrease all kinds of transfers of loads and to use materials handling equipment, which eliminates as much as possible difficult physical labor. All the workplaces were provided with new furnishings of plant design, which enable the mechanic, the lathe operator or the milling machine operator to use the tools efficiently, to decrease the losses of time as much as possible and to work in a comfortable position. In order to reduce the noise, the mechanics and jig borer operators were located in isolated premises.

The technical renovation of the shop created the prerequisites for the change of the forms of the division of labor. First of all multiple-skill brigades of tool makers, which work on a single order in accordance with the end result, were formed. A specific range of items is attached to each such collective, the time of its production is established. The multiple-skill brigade received a personal stamp which confirms that its products satisfy the requirements of the technical specifications. At the same time the primary collective bears material liability for the quality of the items in conformity with the approved statute on self-monitoring. The wage is paid for the finally delivered products, while the total wage is distributed in accordance with the decision of the council of the brigade in conformity with the skills and the coefficient of labor participation.

In connection with the creation of multiple-skill brigades, which are headed by unreleased brigade leaders, the need for senior foremen and foremen of sections disappeared. The brigade leaders are subordinate to the chief or deputy chief of the shop. The technological preparation of documents is simplified owing to the fact that a process engineer is attached to the brigade. All this made it possible to substantially improve and simplify shop planning and accounting and to reduce unfinished production by one-half. Moreover, the brigade organization of labor helped to solve several other difficult problems. One of them is the training of specialists. Whereas previously 6-7 years were required in order to train a mechanic-tool maker, now 3-4 years are sufficient. The quality of attachments improved, owing to

which the return for refinishing after testing was cut in half, and this made it possible to turn over on first appearance 60 percent of all the parts produced by the tool makers. The cycle of the production of a unit of attachments was shortened from 6 to 4 months, the use of the working time of the basic workers improved significantly, technological discipline and the standards of production increased.

The technical renovation and on this basis the improvement of the organization of production, labor and management made it possible to increase labor productivity in the shop by 53 percent. Due to the simplification of the structure of management 17 engineering and technical personnel (foremen, chiefs of shops) were freed, while the total number of personnel in the shop was reduced by 12 percent. The average wage increased by 12 percent, 80 percent of the output norms were technically substantiated. The improvement of working and living conditions helped to decrease the turnover of tool making personnel to one-fourth.

In basic production loading and unloading and transportation operations, as well as manually performed technological operations for a long time were a "bottleneck." The operators of the tubing and film units had to manually pour raw materials into the hopper (several tons a shift), manually remove the heavy products, weigh them, carry them to the warehouse and there arrange them. Under the conditions of continuous production this prevented the operator of an extruder from devoting proper attention to the technological process, product quality and the standards of production. As a result, in order to cope with the production assignments, the shop had to maintain personnel in excess of the plan.

A set of equipment for the automated receiving, storage and distribution of granulated polymeric raw materials was designed and produced at the plant. It includes the automated unloading and storage of raw materials regardless of in what form they arrived (in bags, containers or tanks), and mechanized distribution with centralized control through a network of intermediate capacities directly to the processing equipment. Equipment for the production, transportation and recording of products, including modern manipulators, were used in the completely automated waste-free production of polyethylene films.

The efforts of the personnel of the plant made it possible in 1979-1984 to increase the volumes of the production of film by 6.5-fold and tubing by 2.2-fold. The labor intensiveness of 1 ton of film decreased by 23 percent and of tubing by 20 percent. The direct economic impact came to 285,000 rubles, 108 people were conditionally freed, the labor of all the workers of this works was facilitated. Renovation changed the nature of the labor of the operator of the extruder: now he obtained the opportunity to keep track of the technological process, product quality and the standards of production. Here at present 74 percent of the volume of all products has the Emblem of Quality. The working and living conditions and conditions of the relaxation of workers improved. Owing to the equipment of the extruders with protective housings and the lining of the walls with noise-absorbing materials the noise, which previously exceeded the health standard, has been reduced to a permissible range.

In the foundry, where mainly women work, the automatic lubrication of the molds, the delivery of raw materials and the separation of the gates from the parts were envisaged. All these technical measures made it possible to introduce the brigade organization of labor. For the first time at the plant the adjuster of casting machines, who, as a rule is a brigade (link) leader, was included in the multiple-skill multistage brigade. This innovation underwent checking by practice and is being used in other shops. Technical renovation created extensive opportunities for multiple-machine attendance. Whereas previously one female foundry worker was employed at one or two casting machines, at present a link of four female foundry workers attends up to 26 such machines. Labor productivity increased by 25 percent, 15 percent of the workers were conditionally freed.

The most difficult working conditions at the plant were in the press shop, where mainly women also work. The preparation of its renovation went on for a long time, since a number of problems of the mechanization and automation of the technological process of molding thermosetting plastics in practice had not been solved either in our country or abroad. We were able to find means of increasing labor productivity in the shop and of normalizing the working conditions in it. The State Institute for the Planning of Establishments Producing Plastics and Semifinished Products participated together with the creative group, which was supervised by the deputy director for production, in the elaboration of the plan of the renovation of the shop. In 1983 the first automated line for the molding of thermosetting plastics on the basis of robotic technological complexes, which include a system of the feeding of raw materials to the working zone of the presses, the removal and transportation of products, was installed in the shop. The line was accepted by the state commission, and it was recommended to introduce it at enterprises which have press works. The use of the line made it possible to increase the norm of attendance by more than fivefold.

The automation of the molding process made new demands on the organization of labor, and therefore the existing standard plan no longer ensured its necessary level. A new plan, which stipulates that the lines of the robotic technological complexes are attended by a cost accounting multiple-skill multistage brigade, which includes press operators, adjusters and packers and works on a single order, is now being prepared for the press shop. Labor is paid for in accordance with the end result with the use of the coefficient of labor participation. The fact that the chief of the press shop has been granted the right to settle the question of paying a portion of the bonuses to the equipment and attachment repairmen and to the instrument attendants depending on the degree of fulfillment of the plan by the press section of the robotic technological complexes, is contributing to the efficient operation of the automatic lines under the conditions of the centralized repair of equipment and attachments.

As a whole for the plant the combined solution of the problems of the renovation of production and the implementation of the measures of the extensive social program made it possible to cope with the assignments on the increase of labor productivity, the expansion of production and the increase of product quality and to fulfill and exceed the assumed socialist obligations. In the past three five-year plans the production volume

increased by 2.3-fold and the output of items of the highest quality reached 40 percent, moreover, the entire increase was provided by means of the increase of labor productivity, while the absolute number of industrial personnel decreased by 98 people. The changeover to intensive methods of production occurred on the basis of the introduction of highly productive resource-saving technologies and automated waste-free production systems and the sharp reduction of the expenditures of manual labor by complete mechanization and the use of robotics. Along with technical improvement steps were taken on the improvement of the working and living conditions and conditions of the relaxation of workers, on the creation of a favorable moral and psychological climate and so on. Owing to renovation the capacities on the existing areas were increased by twofold. The expenditures of labor on loading and unloading operations were reduced significantly, while in case of the arrival of polyethylene raw materials in tanks and containers they were completely eliminated. The basic indicators for the renovated works significantly exceed the sectorial indicators.

During the renovation of the plant 420 units of equipment and means of mechanization and automation and 1,125 units of machine tool attachments were produced. The bulk of the developed equipment and technologies are protected by certificates of authorship for inventions and have undergone state registration at the All-Union Scientific and Technical Information Center. The accomplished and introduced developments have been commended by 42 medals of the Exhibition of USSR National Economic Achievements. Technical specifications have been turned over to 123 enterprises and 9 departments. The plant cooperated with scientific research and design organizations, the Leningrad Institute of Labor Protection, the Vilnius Scientific Research Institute of Heat Insulation, the Institute of Philosophy, Sociology and Law of the Lithuanian SSR Academy of Sciences and Vilnius State University imeni V. Kapsukas. In 1978 it was awarded the Lithuanian SSR State Prize in Science and Technology for the elaboration and implementation of a set of measures on the improvement of the working and living conditions and conditions of the relaxation of workers. In 1984 the collective of authors under the supervision of plant director A. L. Grishkyavichus was awarded the USSR State Prize in Science and Technology for the development of highly productive, automated waste-free production systems of the processing of plastics with the use of robotics.

As is known, the party teaches us not to be satisfied with what has been achieved. Much has been done and it is possible to do even more, but here not everything depends on us. Thus, technical renovation created opportunities for the extensive use of an automated production control system, but its efficiency for the present does not satisfy us. It is possible to group both the shortcomings in the standards service and the strained raw material balance of the plant, which precludes the possibility of the highly efficient use of production capacities, with the reasons for this. The insufficient delivery and the irregular supply of raw materials are having an adverse influence on the results of production, are worsening the organization of labor and are affecting the state of its norm setting.

In our opinion, for the successful solution of the problems of the intensive development of production it is necessary to establish permanent relations

with design institutes, scientific research institutes, technical and even humanities higher educational institutions, for the more complete meeting of the social needs of workers and the improvement of the style of management would contribute to the increase of their creative activity.

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TRAINING AND EDUCATION

IMPROVEMENT OF VOCATIONAL GUIDANCE, COLLECTIVE SCIENTIFIC WORK

Moscow KOMSOMOLSKAYA PRAVDA in Russian 23 Jun 85 p 1

[Article by engineer N. Kudryakov in the column "The Occupation Is a Scientist": "How Is the Impact to Be Increased?"]

> [Text] The acceleration of scientific and technical progress depends on many factors and, first of all, on people--on the scientists, specialists, engineers and managers of science and production, who are making their contribution to the common cause.
>
> But is everything that well in the shop of scientists? Is everything being done by everyone so that scientific and technical progress would receive new acceleration? The editorial office is commencing today a new column--"The Occupation Is a Scientist." With your assistance, reader, we intend to find answers to these and other questions: What can be done in order to improve the selection of young people who are going into science, how is the institution of research trainees to be made effective, how are the key problems of graduate studies to be solved?
>
> We want to turn to the experience of the best examples and the existing bottlenecks in science, which, we hope, you, the reader, will suggest.

Scientific methods of occupational choice and vocational training are being used in practically each of the existing specialties. But we are training only scientists themselves, at random, counting on the abilities, ambition and persistence of the young intellectual himself.

The future artist draws for 2 years dusty plaster heads, the future composer plays the same scales to the point of being possessed, remembering that the polishing of the art is at the basis of creativity. But as soon as the conversation turns to such a creative profession as science, we even find it difficult to say in what the technical, craftsmanship principles of this occupation consist. We send our children to sports and art schools, correctly

believing that the earlier talent is identified and developed, the better. But given all our physics and mathematics contests, television courses and multitudes of coaches the most wild and false notions about science are forming among school children.

And if we speak of science as an occupation, does not the school understand in a too one-sided manner its tasks on vocational guidance? The party calls the acceleration of scientific and technical progress the basis of our development. But from where will advanced equipment and technology be gotten, if the training of scientists and engineers is not improved qualitatively?

The goal of vocational training is not only labor skills, but first of all the cultivation of a specific attitude toward life. First of all the cultivation of respect toward labor as the basis of any culture. Only it is not necessary to consider solely labor at a machine tool as labor. And to consider science as something pleasant, not dusty and so forth. When engaging in vocational guidance, it is necessary to remember that scientific labor is labor in the full sense of the word, which requires of a person a strict attitude toward himself, decency and courage, enormous self-dedication and the capacity for exhausting heavy work.

We are saying so much about the contact of science with production that we are beginning no longer to connect, but to confuse science with production. One of the basis causes of the misunderstanding of the specific nature of scientific labor, in my opinion, lies in the fact that we have ceased to distinguish scientific problems from production and technical problems. Without this understanding there will also be no occupational culture. Science solves scientific problems--the essence of the occupational culture of a scientist also consists in the understanding of this truth. That is why such attention was devoted to these problems at the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress. At the conference it was stressed that it is necessary to attach priority importance to the development of basic science, that precisely it acts as a generator of ideas, makes breakthroughs into new fields and provides outlets to a new level of efficiency.

In recent years a regrettable phenomenon--the decrease of scientific productivity among those who have defended dissertations--has appeared, the percentage of graduate students, who have not defended dissertations at all or have not defended them on time, is increasing. The average age of degree seekers is increasing. So why does a graduate student fail to get to the defense and, so to speak, fade? And why does he, who has defended his dissertation, bear little and poor fruit?

We have just spoken about one reason.

The second is that today it is possible to work professionally (and, hence, while seeing the future) only in a collective.

Incidentally, one of the shortcomings of the economic contractual system of the higher educational institution is the lack of a scientific collective. The scientific problem in this case is not differentiated, but is broken up

into pieces, on which dissertations can be written, by the back streets of higher educational institutions. At times the matter is carried to the point of absurdity, when one theme is distributed among different higher educational institutions.

The highest manifestation of the scientific collective is the scientific school. The following expression exists: he is capable, but he does not have a school. Unfortunately, we have too many graduate courses--many more than the scientific collectives, which have the potential and traditions of a scientific school. As is known, the number of institutes, the scientific councils of which have the right to accept dissertations for consideration, is strictly specified and limited. Thus, might it perhaps be worth also limiting the number of institutes, which have graduate studies and put in order the seeking of degrees? Let the scientific research institute or higher educational institution first prove by its work that within its walls a scientific collective, which is capable of training true scientists, has been formed. At present practically anyone can write dissertations and wherever you like.

When anyone you like begins to deal with some matter and wherever you like, that is, as if everyone and everywhere, this in the end has the result that no one nowhere properly deals with this matter.

"Who became scientists?"--the article in KOMSOMOLSKAYA PRAVDA posed such a question. The question is rhetorical, but a specific answer can be given to it--at times these are dilettantes, casual people and people science does not need. But why? The lack of vocational guidance and occupational choice. Weak and vague vocational training. As a result there is weak occupational culture and, in the end, unprofessional work. What could be worse?

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TRAINING AND EDUCATION

COMPUTER SPECIALIST TRAINING AT NOVOSIBIRSK POLYTECHNICAL SCHOOL

Moscow KOMSOMOLSKAYA PRAVDA in Russian 10 Jul 85 p 2

[Article by V. Solodov (Novosibirsk): "Exercises on the Display"]

[Text] Several years ago a paradoxical situation occurred at the Novosibirsk Academy Campus. The Siberian scientific center was one of the first in the country to begin to introduce modern forms of the organization of scientific research and instruction in the latest computer technology. There was a polytechnical school which trained personnel for the maintenance of computers. It was so inconspicuous alongside the famous institutes that many people, even among those living on the Academy Campus, did not suspect its existence. But the "computer boom" broke out, and everyone suddenly saw: what a weak and archaic one it is, this tekhnikum, which found itself by the irony of fate at the very point of scientific and technical progress! Even the opinion to close it altogether was voiced.

They would probably have done that, if the need for technician-programmers and specialists in the maintenance of computers had not been so urgent. This also decided the fate of the tekhnikum. They appointed for it a patron--Novosibirsk State University.

Much in the "younger brother" did not suit the university. The tekhnikum persistently oriented its graduates toward work at computer centers of the classical type--with one or two large computers. And this is at the time when minicomputers and microcomputers, which are capable of easily "blending" with a small scientific laboratory, an educational classroom and a production subdivision, have begun to emerge in a broad arena. It was a matter of the radical reform of the syllabus. But not only that. The university posed the task more broadly--to accomplish a qualitative jump in the training of middle-level specialists, to increase the prestige of the tekhnikum and to ensure an influx of capable young people.

They began to seek a person who could accomplish this. Everyone, except Laskin, declined. When they were confirming him as director, there were objections: he is young, without pedagogical experience.

Did he understand to what he had agreed?

At that time the ability of a mathematician to distinguish the main thing in the solution of any problem helped him not to drown in a sea of problems which had welled up. Very soon 33-year-old Viktor Laskin, director of the tekhnikum, would understand how difficult this is--not to lose in the details and economic concerns the essence of the contemplated reform.

Questions, questions. Why do students of the tekhnikum begin to study the main subject--programming--not in the first year? Why do they teach the most modern specialties in the old way? Why do the graduates of the tekhnikum after assignment to a works or to scientific institutions have to be retrained?

So far they have taught programmers at the tekhnikum to draw up various computer programs in accordance with given algorithms. But soon this will cease to be a secret behind seven seals. With the computerization of science more and more specialists in the most diverse fields of knowledge--economists, biologists, engineers--are independently mastering programming methods for the solution of their own problems. Not simply executors, but so-called systems programmers are needed. Their task is the mathematical support of the programs for computers. Thereby they will facilitate for novices interaction with the computer.

"I will explain by using an example," Laskin says. "In principle any of us is capable of learning a foreign language and of using it fairly well. But this is the superficial, shallow mastering of a language. Linguists study the internal structure of a language and its laws. Having understood by means of them the 'mechanism' of the language, it will be much easier for me and you to master the language itself, its vocabulary and grammar. Thus, systems programmers are the linguists of the age of personal computers. The need for them is increasing with every day."

A no less important task of current technician-programmers is the development of dialogue systems of interaction with computers. This affords practically any person access to them.

Laskin enlisted the instructors of the tekhnikum and leading specialists of the scientific center in the development of a new syllabus. From the very start they arranged to eliminate everything superfluous. They decreased the number of purely information courses. And, on the contrary, they expanded such promising ones as "computer-aided design systems" (SAPR's), "automated production control systems" (ASUP's) and "automated information systems" (AIS's). They rejected several courses altogether.

I will not conceal the fact that such an approach to the established syllabus aroused suspicion and incomprehension among many people. For which Laskin invariably cites the same argument: the syllabus is intended for a specific polytechnical school which is working for a specific scientific center. No, he is far from thinking of overturning the syllabuses which were approved by the appropriate ministries. But, in his opinion, versions, which take into account the needs of the given region, are entirely permissible within such syllabuses. How else is an educational institution to react to the requirements of the day?

Soon the joint scientific council of the university and the tekhnikum will consider the new syllabus. Then the ministry will. Without waiting for final approval, Laskin is knocking at various doors and is hurrying: he wants the tekhnikum to start teaching by the new syllabus already this year. It looks as if that is how it will be.

Acquaintance with computers at the tekhnikum begins with a game. The future programmers learn to draw. The terminal serves as the pencil, the plotter serves as the paper. It is possible to draw everything: portraits, buildings, animals, heroes of animated cartoons. But first it is necessary to compile a program of the drawing and to enter it skillfully into the computer. One must see the faces of the kids while waiting for the result. Excitement, agitation and genuine chagrin in case of a mistake.

But when a game does not have a superproblem, it is only a game. Laskin set himself the goal to introduce in the educational process as many innovations as possible, which stimulate the thinking of students. The modern computer requires active interaction with its partner. Hence, the instruction should also be active. The difficulties here lie not so much in the technical equipment as in psychology. For long years instruction at the tekhnikum was too inflexible. The students gave up asking questions. In the immediate plans of Laskin there are classes in the principle of collective thinking activity and organizational teaching games.

With the assistance of the university at the tekhnikum classrooms of computer-aided design systems and a terminal classroom have been opened, a computer of the new series is being installed. The university is also responsible for the staff of instructors.

"The reform of the school is the reform of the personality of the instructor," Laskin believes.

The terminal classroom and soon another, more advanced one, the joint design bureau of the university and the tekhnikum, the contract with one of the enterprises on the opening at the tekhnikum of a section for the production of printed circuit boards--all this is being put into 1 year of the directorship of Viktor Laskin. He is only at the beginning of the path. Do not get tired, director!

From the editorial office:

The experience of training personnel for the maintenance of computers, which was gained at the Novosibirsk Polytechnical School, in our opinion, merits serious attention. We appeal to the RSFSR Ministry of Higher and Secondary Specialized Education and other interested departments: What steps are being taken to disseminate this experience?

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AUTOMATION AND INFORMATION POLICY

DEVELOPMENT, APPLICATIONS OF MICROELECTRONICS

Moscow KRASNAYA ZVEZDA in Russian 29 Jun 85 p 3

[Article by Lenin Prize Winner and Doctor of Technical Sciences Professor Yakov Andreyevich Fedotov: "Microelectronics"]

[Text] The Communist Party has advanced a program of the acceleration of the socioeconomic development of the country on the basis of the scientific and technical progress. It is a question of rapid advancement in strategically important directions and the changeover to the path of intensification. This was spoken about at the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress.

What role is microelectronics called upon to play in the solution of these problems? How can it influence the increase of the technical level of all sectors of the economy? What has been achieved in this area today and what results can we expect tomorrow?

The editorial office asked Lenin Prize Winner and Doctor of Technical Sciences Professor Yakov Andreyevich Fedotov to answer these questions of our readers.

Today as never before the implementation of Lenin's brilliant prediction can be vividly seen--science is becoming an immediate productive force of society. The extensive introduction of its achievements in practice is the basis of the effective development and intensification of the economy of the country.

"The catalyst of progress," General Secretary of the CPSU Central Committee Comrade M. S. Gorbachev stressed in his report "A Fundamental Question of Party Economic Policy," "is microelectronics, computer technology and instrument making, the entire information science industry. They require rapid development."

Why among the other important directions is microelectronics named first? First of all because in the accomplishment of the task posed by the party--to unite in practice the advantages of our socialist systems with the achievements of scientific and technical progress, moreover, of its latest stage, which promises a technological revolution in many spheres of

production--an enormous role belongs and will belong to the latest microelectronics, which is based on microprocessor equipment.

It is almost as difficult to imagine the world without electronics as it is to imagine the world without the wheel. Electronics places rockets and spacecraft into a specified trajectory, controls their flight and inflight systems. Flights of modern aircraft would be impossible without electronic equipment. Their radar systems keep track of the ground and detect thunderclouds; radio altimeters continuously check the flight altitude, the radio compass keeps track of the correctness of the heading. Special equipment guarantees flight safety under difficult weather conditions and ensures air traffic control.

Electronic methods of controlling technological processes in industry are being introduced more and more extensively. Electronic equipment is an indispensable arsenal of scientific laboratories and computer centers, an important role is being assigned to electronics in medicine and military science.

Radio and television have been connected with electronics since the day of their appearance. Communications and various household appliances are based to a significant degree on electronics. In short, today its "universal necessity" is obvious. The basic merit of microelectronics is its "ability to be integrated" into various technological equipment, the operation of which it should control. This is broadening significantly the horizons of the introduction of micro-instruments and electronic computing devices in all spheres of our practical activity. For we can translate more than 90 percent of all the operations, which are performed by man and his mechanical assistants, into the language of mathematics, program them and assign their performance to automatic machines.

Of course, this has its limitations. It is not advisable and not economically profitable for every case to use a large computer. Alternate approaches are needed. It is here that microelectronics is simply irreplaceable.

It would seem that quite recently it was difficult to imagine that it is possible to place a radio receiver in the rim of glasses, to fit a television and a computer in a wrist watch, to develop miniature pacemakers with a continuity of operation of 10 and more years. Today we cease to be amazed by such "phenomena."

Let us recall the comparatively recent past. When the transistor was invented, they began to call it "a delayed-action bomb the size of a pea." But they did not settle on this "bomb." Transistorization continued, and on a rapidly increasing scale. Whereas previously transistors entered electronics, so to speak, "piece by piece," now this is occurring in "packages" of many thousands of pieces.

Imagine a small silicon wafer--5 mm by 6 mm in size and only 0.2 mm thick. More than 10,000 electronic components: transistors, capacitors and resistors, which are interconnected, are placed on such a miniature "piece." Specialists call them planar.

They called the cluster of a large number of transistors on a single chip an integrated circuit. The first such circuits, which appeared in the late 1950's, replaced only 10 transistors, now they replace already tens of thousands--the scale of integration has reached 10^5. A small chip weighing only a few milligrams will replace 100,000 vacuum tubes.

This is also, as is customary to say, a large-scale integrated circuit, or in abbreviated form an LSI circuit. A new word--"microprocessor"--has entered our usage in recent times. If we give it a comprehensive interpretation, a microprocessor is also a large-scale integrated circuit, which was been produced by means of an especially complicated technology (X-ray lithography and others--but this is the topic of a special discussion) and is capable of performing the functions of the central unit of a computer.

At present microprocessors are the most popular and inexpensive computing device. Suffice it to say that at present the volume of the world production of microprocessors is estimated in the hundreds of millions of specimens a year, while the price of their most popular models has decreased to less than 10 rubles. The appearance of these most amazing electronic micro-instruments is paving the way for computer technology into various areas of human activity, for which the barriers of cost and the copying of previously produced computers proved to be insurmountable.

I have mentioned the universal necessity of microelectronics. And this is not simply words. There were 2,000 different spheres of application of microprocessors in our country 10 years ago. These were production control, scientific research, transportation and communications, communal and municipal services, library science, bank accounting, meteorology, office mechanization facilities, medicine, education and so on. It is possible to presume that during the 12th and 13th Five-Year Plans the number of spheres of application of microprocessor equipment will increase by many tens of times.

There are all indications that in the very near future microprocessors will revolutionize the processes of industrial production, instruction and so on. However, every step in this direction comes with enormous difficulty: it is necessary not only to solve difficult technological and production problems, but also to overcome the barrier of mutual misunderstanding, which arises at times between scientists, designers, process engineers and production workers, who should introduce this equipment, but should not check the pace of the microprocessor revolution.

I believe that all of us in the routine of daily concerns should not miss the main direction of the development and the central problems of a rapidly growing and promising field--microprocessor equipment. It is important to understand that the advantages of these "devices" lie not only in the weight, the dimensions, the decrease of the consumed power, the inexpensiveness and the reliability, but also in the sharply increased complexity and speed of the mathematical operations which are performed by them.

I will cite the following example of the "old" and the "new." A modern computer, for example, in volume is one three-hundred thousandth as large as the first vacuum tube computer, it uses one fifty-six thousandth as much

electric power, while its reliability is 10,000-fold greater than that of a vacuum tube computer. It is difficult to say which of the problems stimulated to the greatest extent the appearance of the transistor--the problem of the weight and dimensions or the problem of reliability. No-failure operation for 10,000 years is an impressive indicator. The simplicity and inexpensiveness of "chips" are so great that they give grounds to assert: this miniature component is affording us the opportunity to save vast resources and to do a large number of important jobs efficiently and more rapidly.

The present scientific and technical revolution is developing in a number of directions. The automation and cybernetization of all social production, including not only the extraction and processing of raw materials and energy and the production of industrial and agricultural products, but also planning and design operations, as well as management at all levels, are one of the most important ones among them. Such complete automation, about which a few years ago for the most part only science fiction writes spoke, is now becoming a quite realistic task of the day. And this is occurring owing to the achievements of microelectronics.

NC machine tools, flexible automated manufacturing systems, various teaching machines and "broad professional" robots, equipment for the monitoring and control of various physiological processes of man--all this and much else need the extensive production and introduction of microprocessor equipment.

Here is just one example. A set of standardized microprocessor modules, which can be built into medical instruments, can determine the capacity for work and the nervous and mental activity of pilots, cosmonauts and drivers and can carry out the monitoring of the state of operators in industry, aviation and the fleet for the purpose of optimizing their labor and relaxation, is being displayed at the Exhibition of USSR National Economic Achievements.

With the use of microprocessor equipment in ordinary motor vehicles the consumption of fuel is reduced by 10 percent, the toxicity of the exhaust is reduced by 20 percent, the durability of engines increases, the distance traveled by motor vehicles between overhauls increases. There are also other impressive figures.

Such are the achievements of today. But what is it possible to expect tomorrow?

Electronics is a rapidly developing sector. Fourth- and fifth-generation computers will succeed the present models. And the more rapidly this occurs and the sooner they become established in various sectors of the national economy of the country and in scientific and design collectives, the larger the economic impact we will obtain.

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AUTOMATION AND INFORMATION POLICY

DEVELOPMENT OF AUTOMATION EQUIPMENT FOR COTTON INDUSTRY

Tashkent PRAVDA VOSTOKA in Russian 29 Jun 85 p 3

[Article by Candidate of Technical Sciences Kh. Davydbayev, director of the Central Scientific Research Institute of the Cotton Industry: "The Path to the Automated Plant"]

[Text] At the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress a task of particular importance was singled out--to find and put to use all the reserves of the increase of production efficiency and product quality.

The tasks posed by the party on the intensification of production on the basis of scientific and technical progress are close and clear to us: to the collective of the main sectorial scientific research institute of the cotton ginning industry, which is called upon to determine the technical policy in the sector.

The institute jointly with design organizations and machine builders in recent years has engaged in earnest in the retooling of gin mills. The PLPKhVM-02 and LS-1C flow lines for the drying and ginning of cotton, which have changed the character of gin mills, have been developed and are being introduced, which has made it possible to decrease the mechanical actions on the fiber, to lower the metal content, to reduce significantly the production areas and to improve working conditions.

For the purpose of saving fuel and energy resources the institute developed and assimilated in series production at the workshops of of the pilot gin mill new heat generators for the driers of raw cotton, which greatly surpass the previous ones--the STAM-K-2. As a result the consumption of fuel decreased by 28 percent, electric power--to one-half to two-thirds and metal--to one-tenth to one-eighth.

The DV-1M roller gins with a productivity much greater than that of existing gins, more efficient lint cotton cleaners of thin-fibered strains of cotton and other equipment, which were developed by the institute, are being introduced extensively.

Taking into account the particular importance of the timely drying of very moist raw cotton, especially at the peak of its procurement, the institute jointly with the State Special Design Bureau for Cotton Ginning developed the more advanced MS cotton drier. The extraction of moisture as compared with the former driers is much greater, moreover, the natural qualities of the cotton are also preserved. In 1984 the MS drier was accepted by the interdepartmental commission and was recommended for series production.

The achievements, of course, are pleasing. And at the same time in industry there are a number of problems which it is necessary to solve without delay. Steps are being taken in this direction.

One of the problems is the mechanization of difficult and labor-consuming jobs at procurement centers.

At present the procurement network accounts for more than half of all the capital investments in industry. And still the level of mechanization of jobs at procurement centers is low. Thus, 100-150 workers and kolkhoz farmers are attracted for the season to a procurement center for the baling of cotton with a total volume of 10,000 tons. Is it to one's disadvantage? Yes! Therefore, the Central Scientific Research Institute of the Cotton Industry developed schemes of the mechanization of labor-consuming jobs at gin mills and procurement centers. A prototype of a unit for the formation of bales (a baler), which makes it possible to mechanize the operations on the distribution, compacting and formation of bales with an average hourly productivity of 26 tons an hour and a capacity of up to 40 tons an hour, was developed, produced and tested under production conditions. Two operators are employed in attending the baler. Here labor productivity increases by 10- to 15-fold, the number of workers is reduced to one-tenth, a bale weighing 300-350 tons is formed in 2-3 days instead of 10-15 days given the existing system of acceptance. The probability of the mixing of industrial strains of cotton in one bale is practically eliminated and the opportunity for timely preventive maintenance for the purpose of the preservation of the cotton appears.

Prototypes of receiving units complete with means of handling and distribution have been developed--without expenditures of manual labor it is possible to unload trailers with cotton in 2-3 minutes. The productivity of the unit is up to 40 tons an hour.

The State Special Design Bureau for Cotton Ginning developed and produced a prototype of a more maneuverable tunneling machine, which made it possible to completely avoid difficult manual labor in the performance of this operation. The prototype is being submitted for acceptance tests.

The objective instrumental acceptance of raw cotton from cotton suppliers is of great importance for the increase of the quality of products and their accounting.

As studies have shown, such acceptance at procurement centers in practice completely eliminates above-standard transfers of cotton to lower grades of

fiber. The yield of fiber increases, the quality of the output being produced improves.

For the accomplishment of instrumental acceptance the first-generation ASPKh automated information and measuring system and the LKZ unitized laboratory, which were developed by the Signal Scientific Production Association in accordance with the original requirements of the Central Scientific Research Institute of the Cotton Industry, have been accepted for series production. High-speed instruments, such as the VSKh-2 moisture meter, the ASKh-1 grader, the USS unit for the drying of cotton samples and the UOP-1,5 sampler, make it possible to determine much more rapidly the grade, moisture content and dirtiness of products and other qualities of them.

At present the institute jointly with the Signal Scientific Production Association is working on the development of the second-generation system. The time of the performance and the labor intensiveness of the analysis will be significantly reduced by the exclusion in this system of the operations of sample preparation (the drying and cleaning of samples) and the combining of measuring operations. It is anticipated that not more than 5 minutes will be required from the moment of the taking of samples to the issuing of a receipt to the cotton suppliers.

The institute is studying the organization of the acceptance of raw cotton from cotton-growing farms and the payment for it subject to the quality and the content in it of fiber. The system of product acceptance in accordance with the fiber makes it possible to increase the interest of cotton suppliers in the growing of cotton with higher indicators of the quality and the quantity of the fiber contained in it and to improve the accounting and planning of the production of output at gin mills.

The institute is engaged in the development of new equipment for the retooling of basic production of gin mills. For the cleaning and ginning of raw cotton and the cleaning of fiber and lint units and flow lines are being developed in place of odd machines which are united in banks. The units make it possible to decrease sharply the handling equipment at the gin mill (conveyors, worm conveyors) and to reduce the metal content and power-output ratio of equipment. The production areas will be reduced, the mechanical action on the cotton will not be so strong. The average productivity of the set of technological equipment should increase from 12 to 20 tons an hour, with the simultaneous increase of the quality of the fiber and the improvement of working conditions.

Thus, in cooperation with the State Special Design Bureau for Cotton Ginning research is being conducted on the development of a cotton ginning unit with a productivity of 10 tons an hour with the improved configuration of the tools for ginning medium-fibered cotton with a ginning effect of 95-96 percent. A prototype of a ginning unit, which was developed by the State Special Design Bureau for Cotton Ginning, will be tested in 1985 at the Kaakhka Gin Mill for the ginning of thin-fibered cotton.

For the flow-line processing of medium-fibered cotton the institute conducted scientific research and prepared the initial requirements--an order for the

development and assimilation of a ginning and fiber cleaning unit, while the initial requirements--an order for the development and assimilation of a new roller gin, the use of which will make it possible to greatly increase the productivity--were prepared for the processing of thin-fibered cotton.

For the purposes of increasing the yield of cotton products and increasing their grade the institute is also developing an efficient technology of the processing of low-grade cotton. Recommendations on the processing of raw cotton of grade IV have been given, have been approved by the USSR Ministry of Light Industry and have been sent to the gin mills for introduction. At the Urtasarayskiy Procurement Center of Tashkent Oblast this has already been introduced.

The introduction of the new technology will make it possible to increase the yield of cotton fiber of low grades by 2-2.5 percent, to increase its grade, to reduce production waste and to increase the yield of oil from cotton seeds in the oils and fats industry.

For the purposes of improving the process of the baling of fiber and decreasing the staffs of the baling shop the Dnepropetrovsk Production Association of Heavy Presses in accordance with the initial requirements of the institute has begun the development of a highly productive baling unit with the use of soft containers made of synthetic material for the packing of bales. Now it is possible to do without metal bands for binding. The introduction at gin mills of the new press will make it possible to save in a year 35,000-40,000 tons of scarce binding material and more than 50 million m of packaging fabric made of natural fibers and to reduce maintenance personnel throughout the sector by 1,000-1,200.

In the plan of scientific research for the 12th Five-Year Plan the basic emphasis will be placed on the complete mechanization of operations and the automation of technological processes, while keeping in mind the ultimate goal--the establishment of an automated gin mill. This problem is very complicated and can be accomplished only by the joint efforts of a number of organizations. In conformity with the assignment of the USSR Ministry of Instrument Making, Automation Equipment and Control Systems and the USSR Ministry of Light Industry the institute jointly with a number of organizations formulated a comprehensive program on the development of automated production control systems, automated systems for the control of technological processes and automated technological complexes for enterprises of the cotton ginning industry.

Two sections of the work are envisaged by the program. The first is mainly the development of a system of the accounting and quantitative regulation of the cotton, which arrives for processing, as well as the development and introduction of means of mechanization, which are furnished with automation equipment, in case of the prompt receipt and subsequent delivery of cotton to production. Here 20-25 workers at each of the gin mills will be released from difficult manual labor, the idle times of equipment will be reduced.

The introduction of the system of the accounting of the cotton, which is being delivered for processing, creates the real prerequisites for the stimulation

of the workers of industry for not only the quantity, but also the quality of products and is one of the components in the matter of increasing the yields of fiber and decreasing the waste.

The fulfillment of the tasks, which have been planned for the 12th Five-Year Plan, and the introduction of the results of developments by 1995 will contribute to the acceleration of scientific and technical progress in the sector and will lead to the increase of labor productivity by 40-50 percent, the decrease of the specific expenditures on the output of products, the specific metal content and the power-output ratio, the reduction of production areas and the increase of the productivity of equipment by 50-60 percent. The great mechanization of all processes, the reduction of atmospheric discharges to sanitary levels and the creation of safe and comfortable working conditions will be achieved. The anticipated economic impact from the introduction of the new equipment is more than 70 million rubles.

But now about what is in the way. The institute is experiencing serious difficulties in implementing and introducing the results of scientific research. Thus, due to the imperfection of the system of the accounting of labor expenditures in the procurement network the development of new means of mechanization for the replacement of difficult, but cheap manual labor is becoming economically unprofitable. Therefore, the obtaining of the agreement of design organizations on the technical specifications for the experimental design development of machines and devices is being dragged out for many years.

For the purpose of speeding up the introduction of means of mechanization in industry and specifying their economic efficiency it is advisable by the joint efforts of the Uzbek Main Administration of the Cotton Industry, the Central Scientific Research Institute of the Cotton Industry, the State Special Design Bureau for Cotton Ginning and State Planning Institute No 4 to carry out at one of the procurement centers the complete mechanization of operations, which eliminates the use of manual labor. On the basis of the existing mock-ups and prototypes of machines and devices to conduct extensive production tests.

Due to limited capacities the Uzbekkhlopkomash Production Association and the Signal Scientific Production Association for a long time have not assimilated in series production the equipment, which was accepted in accordance with established produced and was recommended for series output.

Due to the inadequate supply of gin mills with modern laboratory equipment the introduction of the instrumental acceptance of raw cotton is being delayed. It is necessary to ask the USSR Ministry of Instrument Making, Automation Equipment and Control Systems to increase greatly the output of instruments and means of measurement.

In recent years technological equipment and instruments have been developed on the basis of new, more complicated principles of operation, therefore, the adjustment and servicing of equipment require high skills of specialists. The urgent need has arisen for the establishment of firm centers of the Signal Scientific Production Association and the Uzbekkhlopkomash Production Association for the repair and maintenance of equipment, instruments and

measuring systems, as well as for the training of skilled personnel in their attendance.

In the report of General Secretary of the CPSU Central Committee M. S. Gorbachev at the conference on 11 June in the CPSU Central Committee it was noted: "It is very important to give new impetus to all the work on the development of a network of large scientific production associations, which should become genuine outposts of scientific and technical progress." Suggestions on the increase of the effectiveness of scientific research and planning and design organizations and on the intensification of the integration of science with production were also stated in the report.

At one time the institute came to the USSR Ministry of Light Industry with a proposal on the establishment on the basis of the Central Scientific Research Institute of the Cotton Industry of a scientific production association with the organization of a special design bureau and the construction of a pilot machine plant for the development and the output of small series of new equipment. But it did not get support.

We, however, believe that the establishment of a scientific production association will make it possible to increase the effectiveness of our scientific developments and to speed up their introduction in industry. The experience of the development and production by the forces of the institute of small series of heat generators, humidifiers and other equipment convinces us of this.

The collective of the institute fervently supports the program of the acceleration of scientific and technical progress, which has been advanced by the party, and will exert all efforts, knowledge and experience for its implementation.

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PATENTS AND INVENTIONS

PROBLEMS IN INTRODUCING NARVA INVENTIONS OUTLINED

Tallinn SOVETSKAYA ESTONIYA in Russian 13 Jul 85 p 2

[Article by Chairman of the Narva City Council of the All-Union Society of Inventors and Efficiency Experts A. Ratsevich: "Things Have Not Budged at All There"]

[Text] Until recently the internal ducts of the rotors of steam turbines at thermal electric power plants were cleaned of scale all but by hand. According to the norm more than 130 hours were set aside for this extremely labor-consuming operation. But Arkadiy Myachin, a worker of the centralized equipment repair shop of the Narva Zone of the Estonenergoremont Enterprise, recently succeeded in doing it at the Pribaltiyskaya GRES in 12 hours! Moreover, with excellent quality. Such was the impact of the automatic machine, which was designed by Narva inventors and in which, incidentally, power repair workers of Moscow, Leningrad and Lvov have already taken an interest.

This is one of the many examples of the activity of the innovators of Narva during the 11th Five-Year Plan. They fulfilled their obligation--to increase the saving from introduced proposals in 5 years to 20 million rubles--ahead of time, by the 40th anniversary of the Great Victory over Fascist Germany.

Last year alone more than 3,000 efficiency proposals and inventions with an economic impact of more than 6 million rubles were introduced at the enterprises of the city. And, what is especially important, approximately 15 percent of the innovative ideas involved the mechanization of manual labor, while at several enterprises this share comes to 25-30 percent.

Creative research is being conducted intensively at the Krengolmskaya manufaktura Combine, where about a third of all the efficiency experts of Narva work, at the experimental casting and machinery plant, at the combine of municipal enterprises and in the bus and taxi fleet.

Public forms of creative technical work have undergone further development here. For example, about 580 public creative associations, including 70 public design bureaus, 49 public patent bureaus, 80 councils of innovators and 380 multiple-skill creative brigades, now operate in the city. An annual

saving of more than 3 million rubles has been obtained from the introduction of the proposals which were elaborated by the public associations.

Narva inventors and efficiency experts are making a significant contribution to the money box of the saving of fuel, energy and other resources.

But today, when the urgency of the questions of scientific and technical progress in all areas of the economy has become especially acute, we simply do not have the right to cut ourselves off by our achievements from the problems which are hindering the further development of creative research. And there are more than enough of such problems.

In recent years the attitude toward efficiency experts at the Estonskaya GRES has begun to arouse serious anxiety. The number of authors of proposals here declined from 136 in 1980 to 94 in 1984. The number of introduced efficiency proposals also decreased by nearly a half. A check showed that such a decline of the creative activeness of power workers was a consequence of the independent innovations, which were proposed by M. Gudkin, chief engineer of the plant, as a result of which nearly half of all the received efficiency proposals were rejected. In this connection it is appropriate to recall that, in accordance with the Statute on Discoveries, Inventions and Efficiency Proposals, "the technical solution, which is new and useful for the enterprise and institution, to which it was given, is recognized as an efficiency proposal" (Paragraph 63). It is not only absurd, but also dangerous to make on an efficiency proposal the demand of "particular novelty" on the scale of the country or even a sector, since this takes away from people the desire to treat their work creatively, to display initiative and to think.

At the Estonskaya GRES in response to the criticism they advanced the argument that, they say, the total economic impact from introduced proposals from year to year is all the same increasing. And it is true that it did increase from 1980 to 1983, but subsequently decreased sharply. And during the years of increase they "exploited" some one truly large-scale innovation. Thus, in 1982 the implementation of 1 proposal yielded 502,600 rubles and the implementation of the remaining 76 yielded 101,100 rubles, while in 1983 of the saving of 1,346,300 rubles 1 proposal accounted for 1,286,000 rubles, that is, 95.5 percent, while the remaining 53 proposals accounted for only 4.5 percent. In 1984 there was not one such large-scale proposal--and the total amount of the saving to the credit of efficiency experts decreased to 284,000 rubles, which is quite natural against the background of the overall decrease of the creative activeness at the GRES.

It remains to be hoped that the management of the plant will radically improve the formed, extremely adverse situation. The party committee of the enterprise should also express its opinion. One must also not forget the social aspect of efficiency activity. The involvement of the working people in mass creative technical work is one of the major gains of our state on the social front, which gives millions of rank and file workers a sense of involvement in the development of scientific and technical progress and a sense of being the master of production. And therefore the utmost promotion of the growth of the ranks of inventors and efficiency experts, the creation

for them of the optimum conditions in the collective and assistance in instruction in the principles of creative scientific and technical work, if this is necessary, are the task of economic managers and party and public organizations. And, of course, in no case is it possible to tolerate instances of the stifling of the creative impulse of people, the erecting of all kinds of obstacles in the way of their search or bureaucratic red tape both in the process of adopting and introducing a proposal and in the rewarding of the authors.

Unfortunately, we have frequently had occasion to encounter such red tape.

With the formation in 1983 of the republic Vodokanal Production Association and the inclusion in it of the Narva City Administration of Water Supply and Sewer Maintenance the procedure of promoting efficiency proposals was significantly complicated. After receiving the application of an efficiency expert, the local administration should register it, convene a commission for its evaluation, submit it for the consideration and approval of the chief of the administration, and then send it together with the appropriate documents to Tallinn to the association, where the entire procedure is repeated, from the commission for efficiency promotion to the general director, who gives the final decision on the recognition of this proposal as an efficiency proposal. For a year 17 proposals of Narva efficiency experts were held up in the hearth of this cumbersome bureaucratic labyrinth.

The idea of P. Koshubin and A. Postov on changing the flow chart of primary chlorination at waste treatment station No 2, which since early 1984 has been used in Narva and has yielded an annual impact of 24,700 rubles, is also among them. They sent several times from the Narva Administration of Water Supply and Sewer Maintenance to the association in Tallinn reminders and requests to speed up the consideration of both this and other proposals of the Narva innovations, but things, as they say, have not budged at all there.

Things are also not much better at other production subdivisions of Narva, the centers of the management of which are outside our city. Incidentally, even the proposal of A. Myachin, which I told about at first, which yields such an impressive impact and has interested power repairmen of the large industrial centers of the country, so far has still not been officially recognized: the decision on such recognition and the rewarding of the author has been held up in the republic administration of the Estonenergoremont Production Enterprise and in the Main Technical Administration of the USSR Ministry of Power and Electrification, to which the appropriate documents were sent from Narva back in the middle of May of this year. Due to this red tape the use of the invention of A. Myachin at other thermal electric power plants of the country is also being delayed.

Apparently, the need has arisen to give local production subdivisions financial independence when considering efficiency proposals, if only those, the reward of the authors for which tentatively does not exceed 100 rubles. Another means is to simplify and speed up the procedure of the acceptance of proposals in the superior instances themselves. In any case the problem requires prompt solution.

In the decree of the CPSU Central Committee and the USSR Council of Ministers "On Measures on the Acceleration of Scientific and Technical Progress in the National Economy," which was adopted 2 years ago, the need for the rapid establishment and technical equipment of pilot and experimental bases and works was noted. But here in Narva so far there is not one such base. But the need for them is enormous. Solely due to the lack of them the proposals of R. Petrov, chief of the design bureau of Krengolm, S. Karasev, a former mechanic of the Narva Furniture Combine, and other efficiency experts have not been brought up to industrial use. But all these proposals were aimed at the mechanization of manual labor and the increase of its productivity. The lack of a pilot base is also hindering the production of an automatic machine for the drilling of the wood bases of brushes at the Narva Educational Production Combine. And there are many similar examples.

The Narva City Council of the All-Union Society of Inventors and Efficiency Experts has more than once posed the question of the establishment of experimental bases to the management of the largest enterprises of the city, such as the Krengolm and furniture combines. Back in the late 1970's assurances were received that such bases would be organized, but that was the end of it. Now we are posing the question as follows: if the managers of individual enterprises consider it inadvisable to independently establish such bases at their place, it would be possible to consider their organization on an interdepartmental basis, for example, one for several enterprises. In either case, the problem has come to a head and it is necessary to solve it.

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INDUSTRIAL AND MILITARY APPLICATION

DEVELOPMENTS OF PHYSICAL CHEMISTRY INSTITUTE FOR INDUSTRY

Moscow PRAVDA in Russian 20 Jul 85 p 3

[Article by Director of the Institute of Physical Chemistry of the USSR Academy of Sciences Academician V. Spitsyn, Hero of Socialist Labor: "The Bridge: The Institute--The Plant"]

[Text] Now it is difficult to believe that at one time it was necessary to obtain special permission of the academy for the conclusion by an academic institute of an economic contract with an industrial enterprise. But this is so--the first such contract was concluded by our institute in 1960. Today of the more than 200 scientific research themes of the institute 80 are economic contractual themes. At present we are linked by our operations with 44 union and republic ministries, 60 enterprises and more than 100 sectorial scientific research institutes. The results of hundreds of scientific studies, which have given the state a saving of many millions of rubles, have been introduced.

Our institute, of course, is not an exception among the other academic institutions. They have to their credit many new technological methods, new materials and instruments, which were developed during basic and applied research. However, it should be admitted all the same that this valuable capital is being used in practice to a very small degree. The main difficulty consists in a outlet to an enterprise which would agree to assimilate the production of a new material or instrument.

The basic scientific problem of the institute is the physical chemistry of surface phenomena. The phenomena, which occur at the metal-metal, metal-gas and metal-liquid phase boundaries, and similar ones are very widespread. Therefore the institute with respect to its themes is a polytechnical one. Our themes concern the most urgent technical research, by which the broad nature of the contacts with interested organizations is also explained.

But it also happens that our idea is not immediately accepted by production workers. Then we propose a contract on cooperation and conduct research at our own expense, until we are ourselves are convinced and in practice we convince others that the idea is useful and effective.

Incidentally, the contracts on socialist cooperation are also a system. About 200 of them have been concluded--with plant laboratories, sectorial and academic institutes. These are nonmonetary contracts, they are fulfilled by each side at its own expense and usually lead to interesting joint research.

But let us shift from organizational to practical questions. Even in case of a good creative contract between the institute and production we turn over to it jobs which were performed in the laboratory on gram quantities of matter. In order to assimilate the obtaining of hundreds of kilograms and tons of new products, an important intermediate stage is needed--consolidated tests already on kilogram quantities of materials. They will also give designers and planners much mandatory information on the parameters of the recommended process.

Several institutes have established in their structure pilot plants for the development of technology and the output of a certain quantity of new materials. This was of unquestionable benefit, but did not suit us. Completely different equipment is needed for corrosive operations and the synthesis of new protective means against corrosion than, for example, for radiochemists, for processes with polymer films, for operations with refractory materials and coatings and so on. It would be necessary to build several pilot plants or one so large that its needs would smother the work of the entire institute.

Therefore we organized two rooms for consolidated technological tests. One of them has been operating already 15 years. Any laboratory can obtain work space here, assemble the needed apparatus and perform the necessary work.

The number of completed scientific jobs, which are introduced by the institute in production, owing to such measures is steadily increasing. Whereas during 1975-1982 on the average there were 33 of them a year, in 1983 there were already 86 and in 1984 there were 118. However, not all of them smoothly cover the path to introduction.

We always prefer direction institute-client contact. Intermediate instances merely hinder the matter. It is possible to cite many examples of this, I will cite just the fate of one development. Everyone knows what danger the corrosion of parts presents--especially in complex mechanisms, radio engineering devices and various signaling devices, in which it threatens the failure of crucial components and instruments. The institute developed a number of new, active corrosion inhibitors for aluminum, ferrous and nonferrous metals. Enterprises of many ministries, which dream of reducing by millions of rubles the losses of valuable metals, which are caused by corrosion, urgently need them.

Industry needs tons and even thousands of tons of these inhibitors of the IFKhAN [Institute of Physical Chemistry of the Academy of Sciences] class. Their production should be organized by the USSR Ministry of the Chemical Industry. But more than 10 years have passed, yet the Ministry of the Chemical Industry has never performed this work, although the equipment for synthesis is very simple and we delivered the sketches of it long ago to the Ministry of the Chemical Industry, having guaranteed our scientific and

technical supervision of the assimilation of the plants. The whole point, apparently, is that the ministry is not interested in the use of inhibitors, other departments need them.

We see one solution--to organize their production at a special plant of interdepartmental subordination, which would supply with this important product all the sectors which need it. In general such inertia is surprising: abroad tens of firms are engaged in the production of inhibitors and earn large amounts of money from this.

Frequently industry itself also poses urgent scientific research problems for us. For their quick solution we are using in practice the establishment at the institute of sectorial scientific laboratories by means of staff units and contract assets, which are made available by the interested ministry. For example, in 1972 at the request of the USSR Ministry of the Petroleum Refining and Petrochemical Industry a laboratory of the physical chemical principles of phase separation in heterogeneous systems was organized. A new technology of obtaining sulfate additives for motor lubricating oils, which correspond in purity to the level of the best world standards, was quickly developed by its collective. The work has been introduced at a number of plants of the ministry.

The development of applied operations is also not decreasing the level of basic research of the institute. In several cases precisely practical problems have led our scientific to discoveries of a fundamental nature.

Like other academic institutes, we develop original apparatus for our research. Among such new devices it is possible to name the automatic vacuum microbalance, which operates at temperatures of 20 to 1,200 degrees, at a normal and rarified pressure, in a different gas medium. The corrosion of metals is detected by means of it already in case of the formation of a one-atom layer of oxidized product on the surface of the specimen. A measurement takes 10 seconds. The results of the tests are automatically recorded and processed on computer.

Every year several such new instruments and devices are developed at the institute. Both production and scientific research laboratories are interested in them. But the size of our workshops does not make it possible to produce new instruments even in small series. Their descriptions are published by us in various scientific journals. Individual specialists direct attention to these articles and at times come to the institute to do some work on the new instruments. But still there is not enough extensive information on this aspect of our work. While there are many institutes at which new instruments are being developed at the same time as the basic work. The question of establishing the special journal for chemists NOVYYE NAUCHNYYE PRIBORY, through which information would get to a broader group of researchers, should be posed.

The institute is willing to make available a description and working drawings of its devices. Other institutes can also do the same thing. After establishing the demand for new instruments it is possible to pose the question of setting up a special works for their production.

The increasing introduction of scientific achievements in production needs some legislative regulation. At present the institute in case of the transfer of the results of completed work, besides a sense of creative satisfaction, in essence has nothing. The money, which is obtained through economic contracts, does not increase the wage fund. The associates of the institute, who introduce one job or another, are also not interested materially in this. If the personnel of an enterprise receive a bonus, the associates of the academic institute cannot be paid a bonus by industry, since they belong to different department. There are also such instances when our institute at the request of an industrial enterprise and sectorial scientific research institute helped to introduce a new technology, but in the final report to the ministry and in the certificates of authorship for inventions its participation was not even noted. The authorship of the performers from the enterprise and the academic institute should be officially recorded. Finally, the assistance of skilled economists is needed in the development of a method of recording the real saving from scientific works which are introduced in industry.

The method of the direct interaction of the academic institute with industrial enterprises, which was assimilated by us over the course of 30 years and is registered as a joint plan, undoubtedly justifies itself. Practically no difficulties arise when turning completed jobs over to the enterprise. The brigades of associates work for a long time in the plant laboratories or shops, at times special subdivisions made up of plant and academic personnel are created for them. Everything is subordinate to two simple rules: the academic workers should know the problems facing industry, industry should be familiar with the possibilities of the academic institute. And this work can and should be even more efficient.

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SOCIO-POLITICAL FACTORS

COORDINATING ACTIVITY OF PERVOMAYSKIY RAYON PARTY COMMITTEE

Minsk NARODNOYE KHOZYAYSTVO BELORUSSII in Russian No 5, May 85 pp 28-30

[Article by A. A. Sanchukovskiy, first secretary of the Pervomayskiy Rayon Committee of the Belorussian Communist Party: "The Effect of Cooperation"]

[Text] The bringing of scientific research closer to the requirements of production and the establishment of stable long-term ties between production and scientific collectives are one of the most important directions of the work of the Pervomayskiy Rayon Party Organization of Minsk. Public formations--the technical and economic council and the council of scientists and leading specialists--which are contributing to the acceleration of the introduction of the achievements of scientific and technical progress, are operating under the rayon committee. Scientific production and educational scientific production associations and laboratories of dual subordination have received recognition. The experience of overcoming departmental isolation and coordinating the efforts of enterprises on the acceleration of scientific and technical progress is discussed in the article of A. A. Sanchukovskiy, first secretary of the Pervomayskiy Rayon Committee of the Belorussian Communist Party.

The Belorussian Academy of Sciences with an absolute majority of its institutions, two higher educational institutions and a large number of republic and sectorial organizations are located in the rayon. In all over 27,000 people work at the 63 scientific research and planning and design institutes and bureaus. Moreover, over 3,000 people, or one-tenth of the people in industry, work in the plant sector of science, of which specialists of the Plant imeni S. I. Vavilov, the watch plant, the Termoplast Plant and a number of others constitute the basis.

The concentration of such a significant scientific and technical potential, on the one hand, is creating favorable opportunities for the solution of the problem of increasing labor productivity and, on the other, is causing the need for the use of more effective forms of the management of scientific collectives and the proper orientation of their activity toward the needs and

demands of production. For the stage of extensive development, which occurred rapidly in the past, in its legacy left quite a number of crude organizational scientific subdivisions, the managers of which for the present have not yet learned to think in categories of intensification.

In this connection the rayon party committee and the primary organizations regard as a vital task the strengthening of collectives with practical and competent organizer-managers, who are capable of reforming in a party manner, with a sense of great responsibility the work of personnel in light of the new requirements and of giving priority to fundamentally new scientific and technical decisions which increase substantially the efficiency of social production.

The activity of party organizations and labor collectives of scientific research and planning and design institutions has begun to be analyzed more thoroughly and to be examined more often in the buro of the rayon party committee, at plenums, meetings of the aktiv and conferences.

Owing to the extensive explanatory work of communists the initiative "In the alliance of science with production--a high quality of development and production for every item" has been supported, an active search is being made for new organizational forms of the integration of science with production and for more stable and simultaneous flexible interrelations, which have been consolidated by the mutual interest of the parties.

Today the industrial enterprises of the rayon are fruitfully cooperating with more that 60 sectorial scientific research and academic institutions, the scientific production and educational scientific production associations, which operate as a voluntary service, have received recognition.

The concentration in the rayon of a significant number of academic institutes, scientific subdivisions and industrial enterprises of different sectorial subordination is introducing its own difficulties in the process of the interaction of science with production and requires the concerted efforts of party and soviet organs on the elimination of departmental barriers. They are especially appreciable in the direction of the introduction of scientific and technical innovations. Far from all ministries and departments are settling this issue with allowance made for territorial interests. For example, the suggestions on the establishment of scientific production associations on the basis of industrial enterprises and scientific research institutions are being implemented intolerably slowly, although experience shows that this form of the integration of science with production is one of the most effective. It has been noted more than once that departmental isolation hinders the extensive dissemination of the achievements of science at enterprises of the rayon, city and republic and often gives rise to parallelism in scientific research work.

The technical and economic council and the council of scientists and leading specialists, of which representatives of various scientific, academic and planning institutions, industrial enterprises and construction organizations became members, were established under the rayon party committee for the purpose of ensuring party influence in the solution of these problems. These

public formations are giving practical assistance to labor collectives in the implementation of measures, which contribute to the acceleration of the technical updating of means of production and the improvement of technology, and are promoting the strengthening of the ties of science and production and the improvement of the structure of the management of science and technology.

The identification of the "narrow" spots with the elaboration of suggestions on their elimination, the organization of exhibitions of the scientific and technical achievements of collectives of the rayon, efficiency experts and inventors, the holding of seminars and applied science conferences, the generalization and introduction of advanced know-how, the formulation of comprehensive goal programs, the setting up of multiple-skill creative brigades, goal-planning groups and multistage brigades of quality, voluntary assistance to the permanent exhibition of consumer goods--these are the main directions of the activity of the councils. The rayon party committee specifies them. For example, last year the section "The Saving of Raw Materials, Materials, Fuel and Power" was formed within the technical and economic council. The members of this section are giving procedural and practical assistance to enterprises and organizations of the rayon in the identification of reserves of saving, are elaborating recommendations on the more extensive introduction of resource-saving technologies, power plants and equipment and are generalizing the experience of the leading enterprises.

The technical and economic council made an analysis of the fulfillment by enterprises of the rayon of the assignments on the saving of fuel and energy resources and the decrease of the power-output ratio of the products being produced. The results showed that in the leading collectives the efficient use of energy resources is inseparably connected with the consistent implementation of comprehensive measures on the introduction of more advanced technological units and processes. Thus, an automated system for the control of power facilities based on the TM-301 remote control system was developed and introduced at the Minsk Watch Plant. Its use is making it possible to control more efficiently the operation of the power facilities of the plant, to decrease labor expenditures and to save 10-14 percent of the annual consumption of thermal energy and electric power. Taking into account the general-purpose nature of the automatic unit, as well as the experience of the watch plant in the saving of energy resources, the rayon party committee held here a meeting of the technical and economic council with the participation of leading specialists of the industrial enterprises of the rayon. Close acquaintance with the innovation stepped up the work on the development of similar systems at other enterprises. In the implementation of such measures we see one of the practicable means of overcoming the departmental barriers in the way of the introduction of scientific and technical achievements.

Being well aware of how responsible and large-scale are the tasks which are being solved by the Academy of Sciences both in the republic and far beyond it, the rayon party committee, the party committee of the academy and the party organizations of industrial enterprises, on the basis of the objective possibilities, are developing creative ties on a mutually advantageous scientific and economic basis.

Such a form of integration as the laboratories of dual subordination, which are financed by the enterprise and are managed by the scientific subdivision, also merits attention. As an example it is possible to name the experience of the cooperation of the Plant imeni S. I. Vavilov with the Belorussian SSR Academy of Sciences, with the scientific research institutions of its own department, as well as other ministries and departments through the intersectorial design department.

For the settlement of any important scientific and technical issue at the initial stage the coverage of a broad group of scientific problems is necessary. The services of plants are not capable of solving them on their own, and this would be inefficient. Scientific institutions can cope much better with this work. Their recommendations, which concern the determination of the place of each of these problems from the standpoint of the accomplishment of the ultimate task--the development of new types of equipment, ensure a significant saving of manpower resources of enterprises and, what is no less important, the shortening of the time of the carrying out of development as a whole.

Moreover, the performance of joint work stimulates the more precise practical orientation of the activity of scientific research institutes and higher educational institutions, which also yields an appreciable saving of assets. It is difficult to determine in value terms the specific economic impact of operations at the stage of research. However, extensive cooperation with scientific research institutions is making possible to shorten the time of the performance of operations by 6-12 months, which just within the framework of the intersectorial design department is providing a conditional eco[illegible] impact of about 300,000 rubles a year.

The uniting of the forces of scientists, specialists and production workers is yielding appreciable results. Today 19 completely mechanized shops, 97 sections, 90 flow and mechanized lines and 1,310 industrial robots and manipulators are in operation at the enterprises of the rayon. Last year alone nearly 200 manipulators and highly productive automatic and semi-automatic machines and 6 robotic complexes were produced and introduced, more than 1,500 industrial personnel directly engaged in production were conditionally freed.

Much attention is being devoted to the mechanization and automation of production processes and the introduction of advanced technology at the Minsk Termoplast Plant imeni 60-letiya SSSR. As a result of the introduction of a number of innovations an annual economic impact of 426,700 rubles has been obtained and the relative freeing of 180 people has been ensured here since the beginning of the five-year plan. An annual economic impact of 37,000 rubles was achieved and 18 people were freed just by the mechanization of the gluing on of color patches on the "Rubric cube," while given the increase this year of the program of the production of "cubes" a saving of the labor of 36 people will be provided.

The aspiration of the party organizations of the rayon to solve the problems of the fundamental increase of labor productivity on the basis of the further strengthening of the contact of science with production made it possible in

4 years of the current five-year plan to ensure an increase of labor productivity in industry by 30.8 percent with an assignment of 24.6 percent. Last year labor productivity increased by 8.3 percent. The entire increase of the production volume was obtained due to this factor.

According to the preliminary data, during the final year of the five-year plan we are ensuring an increase of labor productivity by 5.7 percent, which will make it possible to fulfill ahead of time the assignment of the five-year plan on the growth rate of labor productivity and due to this to obtain the entire increase of the production volumes.

At the same time we are well aware that the reserves and possibilities for the further intensification of the economy of the rayon are far from exhausted. The rayon party committee, the primary party organizations and the public formations are striving to give the process of intensification a mass nature and to ensure the bringing of not only the items being developed, but also the entire production process up to a new scientific, technical, organizational and economic level. We already have a number of enterprises and scientific institutions, at which the scientific and technical decisions on new items and technology correspond to the level of the best world achievements.

In this direction the example of the watch plant is interesting. Specialists and scientists of the rayon made an examination of all the technological processes, are carrying out the certification of workplaces, analyzed the designs of parts, assemblies and tools and the possibilities of the multiple use of manipulators and made calculations of the economic efficiency of robotization. As a result in recent times more than 150 robots and manipulators have been produced and introduced here in a year and completely robotized sections have been established. This made it possible to decrease the labor intensiveness of the production of wrist watches as compared with 1971 by 4.5-fold. During the same period labor productivity increased by 185 percent, the production volume increased by 2.5-fold. The collective of the enterprise on 11 September 1984 reported the early fulfillment of the plan of 4 years of the five-year plan on the production volume and the fulfillment a year ahead of time of the 5-year plan on the growth rate of labor productivity.

The experience of the watch plant with the assistance of the rayon party committee is gradually overcoming the departmental barriers and is finding more and more extensive dissemination. Thus, the introduction at the Termoplast Plant of 25 manipulators of the watch plant for robotic complexes provided an economic impact in the amount of 30,000 rubles.

The members of the section of patronage relations of the rayon technical and economic council also took an interest in the problem of increasing the efficiency of the labor of the city dwellers who are enlisted in mass agricultural campaigns. Annually we are forced to tear away from their basic job thousands of people, frequently skilled workers and specialists. But they are used, first of all due to the low level of the mechanization and organization of labor, in far from the best manner. What has been said served as a reason for the independent search for ways of increasing labor productivity at the sponsored farms and for the introduction of the know-how,

which is available in the country, of the industrial technology of cultivating vegetables and other crops. Now a number of industrial enterprises are fulfilling specific assignments on the production of devices and accessories, the introduction of which will make it possible already this year to decrease the size of the "voluntary assistance landing parties."

At the same time it must be admitted that the possibilities of the cooperation of scientists and production workers are still being used far from completely. As paradoxical as it may be, given the existing procedure of planning new equipment continues to remain "unprofitable goods," which frequently come into conflict with the cost accounting interests of the collective. The opposition of the current plans on the production volumes to the long-range plans on the introduction of new equipment occurs. The inertia of the past, which shows in the underestimation of such indicators as the technical level of production, the qualitative, but not the quantitative indicator of the economic impact from new equipment, the gradation of prices for new equipment, the real, but not the conditional freeing of personnel and a number of others, has not yet been overcome.

Today the rayon party committee and the primary party organizations are working on solving these problems under the conditions of the large-scale economic experiment, which is being continued in the country and this year became established at a number of enterprises of the rayon.

Continuing the further work on the strengthening of the contacts of science with production for the achievement of the highest labor productivity, the Pervomayskiy Rayon Party Organization is aiming at the unconditional fulfillment of the outlined assignments of the current year and the 11th Five-Year Plan as a whole and is preparing to greet with new achievements the coming 27th congress of our party.

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CONFERENCES AND EXPOSITIONS

VILNIUS CONFERENCE ON PROBABILITY THEORY, MATHEMATICAL STATISTICS

Vilnius SOVETSKAYA LITVA in Russian 23 Jun 85 p 3

[Interview with Academician of the Lithuanian SSR Academy of Sciences V. Statulyavichyus, vice president of the Lithuanian SSR Academy of Sciences and director of the Institute of Mathematics and Cybernetics of the Lithuanian SSR Academy of Sciences, by SOVETSKAYA LITVA correspondent Zh. Naumova: "The Creative Cooperation of Scientists. On the 4th Vilnius International Conference on Probability Theory and Mathematical Statistics"; date and place not specified]

[Text] Among the fields of science, which determine the basis of current scientific and technical progress, an important role by right belongs to such areas of mathematics as probability theory and mathematical statistics. Today large scientific collectives both in the USSR and abroad are engaged in research in this sphere. Soviet scientists have many important achievements in this direction. Our mathematicians and cyberneticists are cooperating scientific forces with the socialist countries along the line of CEMA and are maintaining extensive contacts with colleagues throughout the world. Evidence of this is the forthcoming 4th International Conference on Probability Theory and Mathematical Statistics, which begins its work tomorrow in Vilnius.

At the request of SOVETSKAYA LITVA correspondent Zh. Naumova Vice President of the Lithuanian SSR Academy of Sciences, Director of the Institute of Mathematics and Cybernetics of the Lithuanian SSR Academy of Sciences and Academician of the Republic Academy of Sciences V. Statulyavichyus tells about the goals and tasks of this forum of scientists of different countries.

[Answer] "First of all," Comrade V. Statulyavichyus said, "I would like to say a few words about the nature and history of the Vilnius international conferences. They are held once every 4 years and the Institute of Mathematics imeni V. Stelkov of the USSR Academy of Sciences, the Institute of Mathematics and Cybernetics of the Lithuanian SSR Academy of Sciences, as well

as Vilnius State University imeni V. Kapsukas are invariably their organizers. The first conference here in Vilnius was held in 1973, while prior to 1970 outstanding symposiums on probability theory and its application were held six times every 5 years in Berkeley, at the University of California. However, due to financial difficulties, incidentally, and a number of other reasons this university was not able to successfully continue the started work, and the well-known statistician (E. Neumann), director of the symposiums, addressed to Soviet mathematicians the request to maintain the scientific tradition and to transfer the implementation of such measures to the USSR. That is how the conference of mathematicians and cyberneticists received a permanent 'residence permit' in our republic, where, it must be noted, the positions in the area of probability theory and mathematical statistics are strong.

"The scientists of the present forum represent 14 union republics and 26 countries of the world. The most prominent mathematicians and cyberneticists of both the USSR and foreign countries will take part in the work of the 4th Vilnius International Conference. These are, for example, Academician of the USSR Academy of Sciences Yu. V. Prokhorov, Corresponding Member of the USSR Academy of Sciences A. A. Borovkov, the Ukrainian researchers and Academicians of the Ukrainian SSR Academy of Sciences V. S. Korolyuk and A. V. Skorokhod, Rector of Tashkent University Academician of the Uzbek SSR Academy of Sciences S. Kh. Sirizhdinov, P. Revesz from Hungary, Vice President of the Polish Academy of Sciences K. Urbanik, President of the Berkeley Society and University of California Professor (E. Scott), U.S. statistics scholars C. Rao and (G. Kallianpur), British mathematician P. Kendall, University of Paris Professor K. Krickeberg, Vice President of the International Statistics Institute and Dutch mathematician (V. R. van Tsvet), Australian scientist (K. Heyde) and many, many others.

"I want to note that nearly all phenomena of nature and society 'obey' the laws of probability, that is, by means of them it is possible to successfully study these phenomena. It has now become obvious that mathematical methods and computer technology are the main tools of all science and of scientific and technical progress. However, N. Weiner, the founder of cybernetics, stressed that the computer is useful only if man poses reasonable problems for it. In other words, how profound and intelligent mathematical models and the mathematical language of the computer will be. It is like sheet music, without which an orchestra cannot play, and in this case the computer cannot work. The means and methods of improving this 'language' will also be discussed at the conference.

"The 4 published volumes, which contain the heads of the reports of the conference participants, will contain 631 reports, including 128 of foreign scientists and 78 of Lithuanian scientists. In addition to scientists of the older generation, 'venerable' ones, talented young people, our replacement and hope, among whom there are graduate students and undergraduates, have been invited to the forthcoming forum.

"Conferences of the highest scientific level are always very useful. They make it possible to better see, determine and be convinced of where the leading positions of the scientific front pass, where the main 'battles' are

taking shape, one has to cross swords in the future. Such conferences, as a rule, serve the cause of peace, contribute to the mutual understanding of scientists of different countries and to the coordination of efforts and promote progress.

"The present conference, which is making it possible to associate with the most prominent scientists of the country and foreign states, cannot but have an enormous influence on the development of mathematics in Lithuania. It is especially gladdening that our mathematicians are not only hospitable hosts, but also equal participants in scientific debates.

"In concluding our conversation I want to emphasize that the 4th Vilnius International Conference on Probability Theory and Mathematical Statistics will undoubtedly also contribute to the solution of the problems in the acceleration of scientific and technical progress, which have been posed by the Central Committee of our party."

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CONFERENCES AND EXPOSITIONS

EXHIBITION OF UKRAINIAN SCIENTIFIC, TECHNICAL ACHIEVEMENTS

Moscow PRAVDA in Russian 7 Jul 85 p 6

[Article by PRAVDA correspondent O. Gusev (Kiev): "Look and Introduce"]

[Text] The displays, which were put together under the vaults of the Science Pavilion of the Exhibition of National Economic Achievements of the Ukraine, included the best of what had been developed by the institutes of the republic Academy of Sciences during the period since the 26th CPSU Congress. Figures, which reflect the impressive saving which either has already been achieved or has been planned where they willingly and creatively set to work, appeared in nearly every explanatory chart to the innovations.

Among the most prominent creators of new equipment is the Institute of Electric Welding imeni Ye. O. Paton. Many of its developments are pioneering ones which exceed the world level. This is the general-purpose tool, which was developed for the first time in the world, for the welding and spraying of various metals under the conditions of space--twice Heroes of the Soviet Union S. Savitskaya and V. Dzhanibekov used it in near earth orbit. This is equipment and instruments, which are necessary for use in exclusively terrestrial, but at times also extreme situations--when performing welding operations in the Far North and under water. The electronic trainer of the welder, which was developed by workers of the Institute of Electric Welding imeni Ye. O. Paton in collaboration with specialists of the Institute of Problems of Modeling in Power Engineering, is interesting. All training operations are simulated in it by electronics. The machine tool for the automatic facing with wire of the crankshaft of a truck engine is distinguished by great efficiency. Every such unit, which is being used at plants of Leningrad and Minsk, saves in a year up to 900,000 rubles.

"Look, engineer, try, technician and worker--and you will not regret having used in practice what was seen at the stands," one of the exhibition visitors wrote in the book of opinions. And he is right. Take, for example, the increase of the yield of petroleum stores. The Petrochemistry Department of the Institute of Physical Organic Chemistry and Coal Chemistry offered an emulsifier of the brand ES-2, which at the Tatar Petroleum Production Association alone in the performance of 1,700 well repair operations yielded

an economic impact of 10 million rubles. The ES-2 has received the State Emblem of Quality, its technology, which was developed by Kiev scientists jointly with workers of the Tatar Scientific Research and Planning Institute of Petroleum, has been turned over to a departmental commission of the Ministry of the Petroleum Refining and Petrochemical Industry and has been recommended for introduction in the sector. But for the present it is obviously being used inadequately, and far from everyone is acquainted with it.

The ministers and managers of enterprises and associations of the republic, who acquainted themselves with the exhibits of the exhibition, spoke with bitterness about the obviously unprofitable consequences of the elementary lack of information. Even they had not succeeded in getting full information about some innovations or others on display. Nevertheless the number of copies of literature at the stands is now also inadequate. There are not enough booklets, leaflets and prospectuses, which would help without hurrying to study and evaluate the innovations and to find out to whom to turn for consultation.

But this is also important. At the same Institute of Problems of Material Science of the Ukrainian SSR Academy of Sciences they will willingly tell how an efficient set of materials and industrial technology makes it possible to obtain parts of increased reliability, minimum weight and low cost. And they will emphasize in so doing that the economic impact from the introduction of just 1,000 tons of powder parts amounts to up to 1.5 million rubles. In addition to that 2,000-3,000 tons of ferrous and nonferrous metals are saved, up to 150 machine tools and 250 workers are freed. Specialists from the Institute of Superhard Materials will show an amazing tool, which will cut even natural diamonds and was developed on the basis of their latest developments--hexanite-R and silinite-R. These innovations increase the labor productivity of machine tool operators by 5- to 10-fold. However, many engineers and workers are poorly informed about them.

The fact that many young specialists are coming here with not only notebooks, but also portable dictaphones, also confirms this. Following the principle "It is better to see once, and then to hear another 100 times." Especially as among those responsible for the stands there are representatives of the institutes, including the authors of the developments, who also answer the questions of those who are interested.

One of such authors, unfortunately, could not attend the exhibition--he was on regular vacation. But still he displayed his innovation: a series-produced Volga with a modernized engine and two bright yellow "balls" in the trunk. They told me that before delivery to the pavilion this limousine without additional filling has covered a distance which exceeds by a fourth the usual cruising range of such cars on one tankful.

The secret of the supermarathon distance, which the Volga, which was reequipped on the suggestion of specialists of the Institute of Gas and the Institute of Civil Aviation Engineers, covers, lies in the fact that its motor runs equally well on gasoline and gas. If it burns up one type of fuel, you change over to the other.

"The pluses here are clear," Science Pavilion Director N. Balitskiy says. "But what about the minuses? The lack of capacities for the multiseries production of gas pressure regulators for the engine and the cylinders, in which the liquified gas should be stored, the need for the mass construction of gas filling stations. True, new types of lighter and completely explosion-proof cylinders have already been developed, plans of gas filling stations exist. The holdup is over who will undertake to introduce the innovations and when."

"By recording these achievements and others similar to them in the direction of the intensification of production," President of the Ukrainian SSR Academy of Sciences Academician B. Ye. Paton summarized, "the exhibition by each of its exhibits--and there are more than 1,500 of them here--demonstrates that scientific and technical progress is becoming the basic means which is capable of increasing labor productivity literally in all units. Permeating our economy, it not simply recommends, but urgently requires machines, equipment and technology to be modernized on the most advanced basis."

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CONFERENCES AND EXPOSITIONS

KISHINEV CONFERENCE OF SCIENTIFIC COUNCIL FOR ADSORPTION

Kishinev SOVETSKAYA MOLDAVIYA in Russian 26 May 85 p 3

[Article by an ATEM correspondent: "In Alliance With Science"]

[Text] The field conference of the Scientific Council for Adsorption of the USSR Academy of Sciences was held in Kishinev. More than 250 scientists of the country, who discussed the results of the work in this field of science and production, took part in it.

"Porous absorbents in recent years have been finding more and more areas of use," Academician M. M. Dubinin, chairman of this scientific council, said to an ATEM correspondent. "But the main sphere of their use is environmental protection. It is now difficult to imagine the purification works of industrial enterprises and the filters in the pipes of heat and electric power plants without adsorbents, while ones of increasingly better quality--microporous ones--on the development of which scientists of the country are continuing to work, have been used in recent years. Domestic synthetic charcoals made from grape seeds and fruit pits, which recover from solutions specific substances, are now purifying several medicinal preparations and even blood. Their obtaining is the service of scientists of the Ukraine and Moldavia. Adsorbents are being used extensively in the production of viscose fibers and in high vacuum equipment, by means of them they are stabilizing the properties of semiconductor instruments."

Scientists of Moldavia told about their research on the use of local bentonite clays for the clarification of juices and the purification of water.

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CONFERENCES AND EXPOSITIONS

YEREVAN CONFERENCE ON STANDARDIZATION IN MACHINE BUILDING

Editorial Note

Moscow STANDARTY I KACHESTVO in Russian No 4, Apr 85 p 13

[Text] From the Editorial Office. Materials on the work of the sections at the All-Union Conference "The Basic Directions of the Further Expansion and Intensification of the Intersectorial Specialization and Cooperation of Production in Machine Building on the Basis of the Standardization of Assemblies and Parts" (Yerevan, 20-23 November 1984) were published in the preceding issue of the journal. In this issue we are completing the publication of survey materials of the conference. It is possible to obtain more complete information on the papers and reports at the All-Union Scientific Research Institute of the Normalization of Machine Building at the address: 123007, Moscow, Ulitsa Shenogina, 4.

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Mass, Large-Series Production

Moscow STANDARTY I KACHESTVO in Russian No 4, Apr 85 pp 13-14

[Article by S. V. Kreyter, deputy chairman of the section: "The Standardization of Assemblies and Parts in Mass and Large-Series Production"]

[Text] A total of 32 specialists from enterprises and scientific research institutes of various ministries and departments took part in the work of the section. In all nine reports were heard. V. P. Varfolomeyev, chief of a department of the All-Union Scientific Research Institute of Construction and Road Machine Building, supervised the work of the section.

Candidate of Technical Sciences S. V. Kreyter, having characterized the principle of the making up of complete sections, said, in particular, that the series nature of the production of products is leaving a significant mark on the organization of the work on standardization.

Thus, whereas the development of dimensional and type-size series or the standardization of the demands on products is of equal importance both for items of mass production and for items of small-series and custom production, the development of standardized sets for the subsequent unitizing or adoption of assemblies and parts in large-series and mass production is not of substantial importance. At the same time, the development of promising ranges or the development of new standardized products list units of components of products is more typical of their large-series and mass production.

Further the speaker noted that in spite of some arbitrariness of the assignment of production to one category or another of series production, the type of production, first of all, is characterized by the degree of specialization of the workplaces in each shop (section). The fewer part operations there are at each workplace, the greater the series nature of production is, and vice versa.

The urgency of the conducting of further research in the area of the theoretical and applied aspects of standardization in their close connection with the problems of the expansion and intensification of the specialization of production (as a basic condition of the continuous increase of product quality) is a priority task.

I. Kh. Pakhter (Scientific Research Institute of Automobiles and Automobile Engines) delivered a very substantial report on the theme "Model Standardized Assemblies and Units of Automotive Equipment Are the Basis of the Development of Specialized, Special and Technological Vehicles in Machine Building and Other Sectors of the National Economy." The speaker noted that modern specialized motor transport, which is designed for transporting specific cargoes, is one of the most important factors of the development of the national economy.

The development of such transport is a very complicated and multidimensional problem. Its solution depends on the further technically and economically advisable standardization of the basic assemblies and units of automotive equipment.

"The Type-Catalogue of Basic Standardized Assemblies and Units of Specialized Motor Transport Vehicles and Trailer Equipment," which was elaborated in the sector, specifies the specific means of standardization on the basis of the standard execution of the components which are being produced and developed. "The performance of work on standardization," the speaker stressed, "made it possible to decrease significantly the range of basic assemblies and units of motor vehicles and trailers and provided a significant economic impact, as well as made it possible to shorten the time of designing."

At the same time the speaker sharply criticized the prevailing evaluation indicators of the level of standardization and substantiated the urgent need for their quickest improvement (the coefficient of interdesign standardization does not satisfy the requirement of planning on not only the state, but also the sectorial level).

I. I. Gurdus (Minsk Motor Vehicle Works) devoted his report to the basic directions in the work on the standardization of assemblies and parts in case of the development of automotive equipment at the BelavtoMAZ Association. He, in particular, said that during the 40-year period of its existence the Minsk Motor Vehicle Works (the main one in the association) had changed five times the design of the basic model, which each time was the base (standard) model for the production of the corresponding family.

A significant portion of the output being produced at the motor vehicle works is motor vehicle chassis, which are used extensively for crane units, drilling units, refueling and tank trucks, mobile motor vehicle repair workshops, various vans and other types of specialized motor vehicles for the national economy.

Owing to the extensive use of methods of standardization, given the availability of about 45 models and modifications, only 2 types of power plants, gimbal gears with common joints, rear axles with common gear boxes, common front springs and only 2 types of rear springs, common steering mechanisms and power steering units and only two types of cabs and beds are used on trucks.

The speaker also told about the work being performed on standardization at the Belorussian and Mogilev motor vehicle works.

The high degree of the standardization of components of motor vehicles in the association made it possible to set up their highly efficient specialized manufacturing systems.

A. Ya. Polyak (All-Union Scientific Research Institute of Agricultural Mechanization) in his report "The Demands of Agriculture on the Standardization of Mobile Agricultural Equipment" indicated that the types of machines and their technical tie-in for the current period and the immediate future are regulated by "The System of Machines for the Complete Mechanization of Agricultural Production."

Having show the rapid increase of the supply of agriculture with mobile agricultural equipment, the speaker indicated at the same time the inefficiency, from the point of view of standardization, of the making up of the fleet of mobile equipment. He, in particular, said that in practice it does not happen that all the representatives of a single standardized family of equipment would be concentrated at one farm (kolkhoz, sovkhoz). And, whereas within a family the assembly and unit standardization is quite high, between families of the same power range it is extremely poor.

Meanwhile, the standardization within each power group of machines for different functional purposes, that is, intergroup standardization, is of prime importance for the user. In this connection the suggestion of the All-Union Scientific Research Institute of Agricultural Machine Building on the criteria of the minimum permissible level of standardization merits the utmost support.

In his report A. M. Kruglyakov (All-Union Scientific Research Institute of Agricultural Machine Building) told about the basic principles of the organization of work on the standardization of items in agricultural machine building.

In his report A. I. Zaytsev (All-Union Scientific Research Institute of Machine Building for Animal Husbandry and Fodder Production) pointed out the tendency for the assembly and unit standardization of machines and equipment for animal husbandry and fodder production even for different functional purposes to increase. However, as the speaker believes, this is not enough. The operators are experiencing considerable difficulties due to the equipment being of different types. Standardization, as well as the development of multifunctional machines are one of the methods of decreasing the difference in types. However, universalization is impossible without scientifically sound work on standardization. The speaker cited a number of examples of universalization, which has been carried out abroad and is based on extensive standardization.

Yu. I. Yegorov (Scientific Research Institute of Automobiles and Automobile Engines) devoted his report to the direction of the standardization of the power plants and units of the running gear of trucks. The speaker stressed that the range of trucks has been made the basis for their standardization. Standardization on the scale of the production association is most effective. The possibilities of intersectorial standardization for assemblies and units, which operate with fundamentally different loads and under different conditions, are very limited. Thus, in the opinion of the speaker, it is impossible to standardize the chassis of a truck and a wheel tractor.

The author of the report stressed that first of all it should be established theoretically what the optimum standardization is, and only after this should the planning of its level be started. The requirement of the continuous increase of the level of standardization does not make, in his opinion, either scientific or practical sense. The standardization of such elements of designs as the overall and mounting dimensions should, first of all, be the basis for standardization. After the performance of such work on standardization the specialization of production should be started. Hence preliminary standardization is the basis of any specialization.

N. D. Otychko (Gazoapparat DNPO [not further identified]) devoted his report to the standardization of the basic types of household appliances and the specialization of production at the plants of the Soyuzgazapparat All-Union Industrial Association.

The statement of A. A. Slepov, who asserted that only the component, which is embodied in metal and has actually be used in several different types of series-produced items, can be considered a standardized component, sounded a certain dissonant note to the general opinion. Thereby the speaker placed outside the work on standardization the work on the development of ranges and parametric, dimensional and type-size series, as well as the elaboration of restrictive lists. Such an approach, in the opinion of the majority of participants in the work of the section, makes the management of standardization impossible.

The section participants made a number of suggestions for inclusion in the recommendations of the conference and spoke in favor of the advisability of adopting a new joint decree of the All-Union Council of Scientific and Technical Societies and the State Committee for Standards on the problem of standardization in order also to involve the scientific and technical community in its solution.

UDC 061.3:006.015.2

General Machine Building Items

Moscow STANDARTY I KACHESTVO in Russian No 4, Apr 85 pp 14-15

[Article by V. Ya. Kremyanskiy, deputy chairman of the section: "The Standardization of Assemblies and Parts of General Machine Building Application"]

[Text] A total of 30 specialists from enterprises and scientific research institutes of different ministries and departments took part in the work of the section. In all 11 reports were heard. Doctor of Technical Sciences A. I. Golubev (All-Union Scientific Research Institute of Hydraulic Machine Building) supervised the work of the section.

V. Ya. Kremyanskiy (All-Union Scientific Research Institute of the Normalization of Machine Building) in the report "Procedural Problems of the Standardization of Products of General Machine Building Application (OMP)" showed that parts of general machine building application in various items of machine building and instrument making make up with respect to the range of type sizes 60-75 percent of the total range of type sizes of parts. Hence the special importance of the standardization and the establishment of specialized manufacturing systems of these parts is obvious.

The construction of the optimum parametric series is the most important stage of the standardization of parts and assembly units. Optimization ensures the construction of series of items, the production and use of which are 10-25 percent less expensive that those of items from series which have been constructed without optimization calculations.

A number of procedural questions of standardization, which need elaboration or development, were indicated in the report. Among them are: the establishment of the size of the representative sample in case of the gathering of data for the standardization of some item within a sector or on an intersectorial scale (practical experience has shown that in many cases the gathering of complete data is impossible or difficult), the means of evaluating the uniformity of the gathered data, the methods of introducing forecasting data in the initial information.

The necessity of the elaboration and extensive introduction in case of the construction of parametric series of items of optimization methods was also reflected in other reports.

The method, which was developed at the Institute of Mining imeni A. A. Skochinskiy, of optimizing the parametric series of hydraulic motors by means of goal functions, which minimize the dimensions and weight of designs with the assurance of specific operating characteristics, was presented in the report of A. Ya. Rogov and L. S. Feyfets "The Development of the Type-Size Series of Hydraulic Motors of General Machine Building Application."

The use of the method made it possible for the first time in domestic practice to construct a unified series of hydraulic motors with nominal torques. The extensive use of optimization calculations ensured the decrease of the weight of the hydraulic motors. A program was developed for the computer-aided designing and the development of the technological processes of several most complicated items.

One of the systems of the organization of work on the decrease of the range of extensively used parts was presented in the report of O. M. Natuchchi and N. F. Luchko. The system envisages the directive establishment of the minimum permissible levels of the standardization of items being newly developed, which have a prototype. The standard component nomenclature of drawings substantially facilitates the selection of parts for standardization and the retrieval of the necessary components from previously completed designs. The maximum values of the rate of use, after the exceeding of which a table of systematization is drawn up and a restrictive range is established, were established for the most prevalent types of parts in the sector. The development of a new original part of the given type is allowed only with the special permission of the chief designer.

The advantages of the standard component nomenclature of drawings for the development of standardized components and the saturation of various items with them were shown in the report of D. I. Tyutikov "The Practice of Performing Work on the Standardization of Items on the Basis of the Sectorial Holdings of Standard Component Drawings." The system made it possible to develop a sectorial classifier of components. It was constructed so that the components of different items, which have the complete coincidence of codes, are, as a rule, interchangeable. "The development of such a classifier," the speaker stressed, "significantly simplifies the choice of previously used components and the development of standard technological processes."

The poor development of information systems is substantially checking the work on the use of standardized components in the items of various sectors.

In the report "The Information Support of the Management of the Range of Parts" Ye. V. Krasnushkin examined the means of using the information channels which are incorporated in organizational production structures both for the limitation of the increase of the range of similar items and for their standardization. The importance of the existence of feedback in such systems was pointed out. "It is necessary to develop such systems," the speaker stressed, "first within a single enterprise or in the design bureau--enterprise system."

The report of V. N. Vasilyev (All-Union Scientific Research Institute of the Normalization of Machine Building) was devoted to the development, which is

being carried out in the State Committee for Standards, of a data bank on the technical level of the products of machine building and instrument making, which are being standardized and unified. The computer-oriented passport of the technical level and quality of a product is the input document in the data bank. In the future it is also proposed to feed into the bank the data of the certificate of state tests of the product, industrial catalogues and the passports of standardized items.

V. N. Solovyev presented the system of standardized monitoring in case of the development of items, which has been adopted in the sector. The speaker noted that the work experience in this area has shown the advisability of organizing such monitoring at all the stages of designing, and at each stage its specific problems are examined. Thus, at the stage of the conceptual design the use of the base (standard) design, the classification of individual decisions by type and so on are checked; at the stage of the detail design the soundness of the development of original assemblies and parts, the conformity to the requirements of the standards and so forth are checked, at the stage of the contractor design the possibility of reducing the range and the breadth of the use of standardized parts are checked.

The report of Ye. T. Tsukanov was devoted to the standardization of the operating documents of purchased items. "For the establishment of the necessary types of operating documents and their content," the speaker noted, "it is advisable to proceed from the algorithms of the work and the information needs of attendants. It is advisable to divide the operating documents, depending on the needs of personnel, into executive documents (only management), functional documents (which make it possible to analyze the state of an item) and constructive documents (for repair purposes)."

N. A. Sidorov in his report told about the work on the development of standardized self-propelled vehicles of the Mogilev Motor Vehicle Works with the use of components of intersectorial application. In the report it was noted that the need for the extensive carrying out of the standardization of components is becoming more and more acute in connection with the universal process of the increase of the types of machines for meeting the increasing diversity of needs.

The effectiveness of the work on the systematic and goal-oriented reduction of the excessive range of fuel and lubricants (GSM) was shown in the report of V. V. Bulatnikov (All-Union Scientific Research Institute of Petroleum Refining) "The Prospect of the Standardization of the Lubricants Which Are Used in Machine Building Items." Up to now the number of grades of fuel and lubricants was measured in the hundreds. The conducted analysis of the operating characteristics of different grades showed that many of them have very similar characteristics. This made it possible to reduce sharply the range of lubricants. As a result All-Union State Standard 26191-84 "Oils, Lubricants and Special Fluids. A Restrictive List and the Procedure of Designation" was formulated.

A. I. Goldshmidt (All-Union Scientific Research Institute of Hydraulic Drive) told about the role of state standards in the expansion of the work on the standardization of hydropneumatic equipment of general machine building

application (OMP) and the need for the establishment or its specialized production.

It was proposed by the section to make the following additions to the decision of the conference:

--in case of the formulation of standards for items of general machine building application to introduce the mandatory optimization of the parametric and type-size series on the basis of the procedural materials of the All-Union Scientific Research Institute of the Normalization of Machine Building and the All-Union Scientific Research Institute of Standardization;

--to use extensively quantitative methods of evaluation in case of the use in the designs of various items of standardized components;

--to introduce in the programs of technical higher educational institutions the study of procedural questions of standardization;

--to recommend to set up a competent commission for the improvement of several aspects of the economic mechanism for the purpose of the further stimulation of the work on standardization and on the establishment of specialized manufacturing systems of standardized items.

UDC 006.015.2:658.516:658.512.6

Technological Processes, Equipment

Moscow STANDARTY I KACHESTVO in Russian No 4, Apr 85 pp 15-17

[Article by Doctor of Technical Sciences Professor L. I. Karpov, Honored Figure of Science and Technology of the RSFSR, chairman of the section, the Moscow Institute of Automobile Roads: "The Standardization of Technological Processes and Equipment"]

[Text] There were heard at the section nine reports which according to the themes can be divided into three interconnected directions:

--the standardization of diverse technological design decisions at the stage of the technological preparation of the production of machine building products;

--the standardization of means of technological equipment;

--the standardization of the structural components of items of machine building as the most important means of increasing their quality.

All the reports heard at the section were devoted to the urgent problems of the further expansion and intensification of intersectorial specialization and cooperation at the stage of the technological preparation of production on the

basis of the extensive unification and standardization of diverse technological design decisions.

In all the reports special attention was devoted to flexible manufacturing systems (GPS), which realize most fully the problems of modern machine building, which are arising in connection with the policy of the all-round intensification of the sectors of the national economy. The flexible manufacturing system as a new type of production, of which complete automation is the basis, fundamentally combines such most important properties of modern large-series and mass production as high productivity, continuity, smoothness and great economic efficiency with flexibility, which is inherent in small-scale and custom production.

As was emphasized in the reports, precisely the flexibility of completely automated manufacturing systems, which is achieved by their adjustability, ensures a high level of the use (utilization) of equipment and the operational realization of scientific and technical progress, of which the relatively frequent interchangeability (modernization) of the objects of production is a companion.

At the same time, domestic and foreign experience attests that the elaboration of methods of the supply, organization and management of the functioning of the entire set of systems, which have been equipped in the chain: research--the designing of the item--the technological preparation of production--production, is possible only on a scientific basis, on the basis of the extensive use of the generalized experience of the leading achievements of science and technology, on the basis of precise methodological principles.

And leading comprehensive unification and standardization at the level of state standards with respect to all objects of all types of the supply of flexible manufacturing systems should be the first such methodological basis of the development and introduction of flexible manufacturing systems.

The speakers noted that the development of flexible manufacturing systems requires new organizational forms of production, which conform to grouped technology and ensure under the conditions of a high level of complete automation and regulated readjustments the continuous, trouble-free and uninterrupted operation of production, its great efficiency and the quality of the output being produced.

Such a problem can best best solved in case of the part-group specialization of the machining sections and shops of an enterprise.

Hence the need for the interconnection, already at the first stages of the development of flexible manufacturing systems, of the technological design characteristics of items with respect to the entire products list, which corresponds to the part-group specialization of the sections and shops and to the technical parameters of the technological modules.

The technological modules, which include NC machine tools and machining centers with means of the automation of auxiliary processes--industrial

robots, are in such organizational forms of production the basic structural unit of flexible manufacturing systems.

The development of standardized optimum series of such modules and their readjustments in the class of state standards is becoming one of the most important methodological requirements of the development of flexible manufacturing systems.

At the same time it was noted that the standardization of technological modules should be closely connected with the classification by type and the standardization of the grouped (part-group) technological processes which are incorporated in data banks.

Here on the methodological level in case of the development of working technological processes unified demands on the technical specifications, regardless of by what method they were drawn up: the manual method, the automated method or with the use of the "process engineer--computer" dialogue, should be ensured.

With allowance made for the prospects of the development of flexible manufacturing systems the documents should conform to the language of computer-aided designing, so as to create a unified system of input data for the development of standard control programs of the technological modules, as well as the correction of these standard or working programs directly at the workplace.

Under the conditions of flexible manufacturing systems the problems of the reliability of technological systems should also be solved in a new way, which has already received partial realization in a number of state standards of the 27th class.

In essence, the conclusion that the unconditional assurance of all the requirements on the part of the technological system, which determines, in the end, the efficiency of the entire flexible manufacturing system and the product quality, should be at the basis of the flexible manufacturing system, at the basis of the interconnection of such functional systems of it as the software, program, hardware, information and organizational systems, would not be exaggerated.

The technological support of the flexible manufacturing system includes the following basic subsystems (tasks): technological design coding; the development of individual parts and items as a whole for technological feasibility; the means of basing and installation; the designing of blanks; technological modules; the flow routes and operations of the machining of blanks; the choice of accessories, working tools, means and methods of control; the designing of special accessories and special working tools; the calculation of the conditions for various types of machining; the technological processes of assembly, testing and norm setting; data banks of: model and standardized technological processes, model standardized and standard accessories, working tools and means of measurement; model standardized adjustments and others.

The organizational structure, which determines the degree of consolidation or differentiation of the named subsystems (tasks), can be different subject to the production volume, the range of items being produced, their technological design complexity, the production system of the enterprise and many other factors.

The main attention of the organizations which are the performers of work on the technological support of flexible manufacturing systems, it was noted in the reports, should be directed to the development of model standardized solutions of the problems which have been posed for them. Here the assurance of the joining, compatibility and unified language of the input and output parameters and the decisions, which are incorporated in the data bank, is a general requirement.

In this connection the task of completing the work on the development of unified state classifiers and coding systems for design and technological purposes, in which the generalized experience gained by sectorial scientific research technological institutes and many machine building enterprises should be taken into account, should be placed in the forefront.

It is possible to assert that the Classifier of the Unified System of Design Specifications, which was elaborated in development of All-Union State Standard 2.201-80, is very necessary; without it, in essence, it is impossible to fulfill at the necessary technical level even the first stage of the work on the grouping of items, which involves the transition to flexible readjustable manufacturing systems.

At the same time, the experienced workers of enterprises, who spoke in the section, were unanimous that the Classifier of the Unified System of Design Specifications needs revision in conformity with the gained experience of enterprises and with the greater reflection in it of the prospect of development and the results of forecasting research, which would ensure the leading principle of the formation of such a most important standard technical document. The experienced workers were also unanimous that the Classifier of the Unified System of Design Specifications should be illustrated, that is, should contain an illustrated guide of parts.

Observations were also made concerning the technological classifier which was developed by the All-Union Scientific Research Institute of the Normalization of Machine Building. First of all, it was proposed to make in it several refinements, which reflect the experience of many years of use of the classifier, in particular, those which are connected with the need for the additional inclusion in the classifier of such methods as electrophysical chemical methods, powder metallurgy, groups of methods of hardening technology and other methods, which reflect not only the present level, but also the future.

There are also individual remarks of a number of works on the shortage of symbols in the files of coded characteristics of the material of parts, the roughness of surfaces and others.

Finally, the assurance of the unity of the classifier of the Unified System of Design Specifications and the technological classifier, which should also be in the category of a state standard, with the classifiers for computer-aided technological designing according to All-Union State Standard 14.417-83 with unified (compatible) documents of technological processes is a very important task in the systems of classification and coding.

At the same time the section participants voiced the unanimous desire in address to the All-Union Scientific Research Institute of the Normalization of Machine Building on the need for the completion in accordance with established procedure of the work on the regulation of the basic concepts, definitions, classifications and evaluations, which are directly connection with the problem of unification as one of the most important components of standardization.

Much space in the reports was devoted to questions of the standardization of machine tool attachments. The speakers cited specific examples of the effectiveness of the standardization of machine tool attachments. Thus, at one of the enterprises the standardization of machine tool attachments made it possible to decrease their range by 15-20 percent, here the expenditures on the elaboration of design specifications were reduced by 10 percent.

A great impact from the standardization of equipment of mechanized flow lines for assembly and welding work has been achieved at shipbuilding enterprises.

The standardization of machine tool attachments in flexible manufacturing systems is especially urgent. Under the conditions of flexible manufacturing systems machine tool attachments are a specialized device, which consists directly of standardized and unified components (modules) with readjustment both on the machine tool for a narrow range of groups of items and in the system of the flexible preparation of production for a wider range of groups of items, which are intended for machining on the corresponding technological modules.

It is clear that here much work still lies ahead on the establishment of the optimum number of accessories and their readjustments for the given range of groups of parts and the program of their production, the peculiarities of the design unit, which stems from the demands on the automated positioning of parts, and others.

The speakers directed particular attention to the need for the standardization of industrial robots.

The speakers also directed attention to the fact that in case of the standardization of machine tool attachments the standardization of fastening components and the full accord of the requirements of the state standards on this question with the standards of CEMA, the International Organization for Standardization and the International Electrotechnical Commission should also be ensured.

Finally, the development of information retrieval systems of technological support (IPS TO) should be considered one of the basic strategies of the methodological level.

The basic tasks of information retrieval systems of technological support are to contain data banks and to carry out the retrieval of:

--the identifiers of the technological design characteristics of all components of items, which are provided by the corresponding flexible manufacturing systems;

--standard decisions (standard programs) for parts and assembly units with respect to the choice of flow routes, operations, equipment, accessories and means of the mechanization and automation of auxiliary processes;

--standard programs (algorithms) for the designing of technological processes, equipment, accessories and means of the mechanization and automation of auxiliary processes;

--standard reference materials, which are necessary for the solution of diverse problems of the system of technological support.

This consolidated list of basic problems already determines the role of information retrieval systems of technological support in the entire flexible manufacturing system, both with respect to the importance of the problems being solved and the need for the standardization of their solutions and with respect to the amount of work being performed.

In this connection it is appropriate to note that many initiatives on the development of systems of the computer-aided designing of technological processes, sections of flexible manufacturing systems and even standard and grouped technological processes for comparatively simply items did not come to end results as a consequence of the underestimation of the importance of the development of the information retrieval systems, its labor intensiveness and scientific and technical complexity, the lack in a number of cases of standard reference data, the inadequate technological preparation of the performers and so forth.

Interesting material on the question of the development of an automated system of the standard information support of the continuity of planning, design and technological decisions, which aroused an active discussion, was contained in the report of Yu. A. Miroshnichenko, B. B. Plevako, Ye. N. Aleksandrov and V. S. Dyakonov.

On this issue the section unanimously recommended the establishment at the main organizations of the sectors of automated systems of standard information support, in which particular attention should be devoted to standards and standardized technological design decisions.

The third direction of the themes of the reports in the section is connected with the problem of standardization as a means of increasing the quality of machine building items.

The fact that product quality is a physical category, which is governed by a large number of technological design and technological organizational factors which appear in interconnection at all the stages of the life cycle of items, is basic here. Without going into the essence of the indicated interconnection, it should merely be indicated that the norm setting, the standardization of such factors at the stages of the life cycle affords additional possibilities of the increase of product quality.

In the section the reports, which were devoted to questions of the designing of items and their use, were listened to with great interest. In this connection it was noted in the section that the optimization of the geometric parameters of the structural components of items with respect to strength criteria will contribute substantially to the standardization of parts of machines when designing items, which is of particular importance for computer-aided design systems.

The maintenance of the required indicators of quality at the stage of the use of items can be achieved, as was shown in the report of the representatives of the All-Union Scientific Research Institute of Medical Technology Testing, on the basis of the development of standardized systems of the maintenance and repair of medical equipment.

As a result of the work of the section the great usefulness of the held all-union conference was noted and suggestions, which are aimed at the further stepping up of the work in the area of standardization at all the stages of the life cycle of items, were inserted in the draft of the recommendations of the conference.

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AWARDS AND PRIZES

LATVIAN ACADEMY PRIZES FOR SCIENTIFIC RESEARCH

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR in Russian No 5, May 85 pp 137-138

[Article: "The Prizes of the Latvian SSR Academy of Sciences"]

[Text] The 1984 Prizes for Scientific Research Works

In conformity with the Statute on Prizes of the Latvian SSR Academy of Sciences the Presidium of the academy at the meeting on 14 February 1985 adopted a decree on the awarding of the 1984 prizes for the best scientific research works and developments of scientists.

1. The prizes of the Presidium of the Latvian SSR Academy of Sciences for scientists and engineering and technical personnel were awarded:

First Prize

--for the series of works "The Physical Principles of Charging Processes in Silicon-Silicon Dioxide Plasma Film Structures" (Physics and Power Engineering Institute) to Candidate of Physical Mathematical Sciences A. S. Virtmanis, Doctor of Physical Mathematical Sciences I. A. Feltyn, Candidate of Physical Mathematical Sciences L. A. Freyberg;

--for the work "The Development and Introduction in the National Economy of a Family of Network Microprocessor Adapters of the Unified System of Electronic Computers and the International System of Small Computers" (Institute of Electronics and Computer Technology) to laboratory chief V. S. Ivanov-Loshkanov, Candidate of Technical Sciences E. K. Karnitis, group chief I. M. Timofeyev;

--for the series of works "The Analysis of the Deformation and Strength of Cylindrical Shells Made of Composite Materials Under Dynamic Loading" (Institute of Polymer Mechanics) to Candidate of Physical Mathematical Sciences A. V. Bogdanovich;

--for the work "The Obtaining of Highly Dispersed Powders of Refractory Compounds and Their Use in the Development of Materials With New Properties" (Institute of Inorganic Chemistry) to Candidate of Technical Sciences T. N.

Miller, Candidate of Technical Sciences Ya. P. Grabis, Candidate of Technical Sciences I. V. Zalita;

--for the monographs "Gazovaya khromatografiya aminosoyedineniy" [The Gas Chromatography of Amino Compounds] and "Zhidkostnaya khromatografiya aminosoyedineniy" [The Liquid Chromatography of Amino Compounds] (Institute of Organic Synthesis) to Candidate of Chemical Sciences A. A. Anderson;

--for the monograph "Pishchevaritelno-transportnaya sistema enterotsitov" [The Digestive-Transport System of Enterocytes] (Institute of Biology) to Doctor of Biological Sciences R. I. Kushak;

--for the monograph "Ustoychivost virusov k khimopreparatam" [The Resistance of Viruses to Chemical Preparations] (Institute of Microbiology imeni Avgust Kirkhenshteyn) to Candidate of Medical Sciences V. A. Kalnyna, Junior Scientific Associate R. L. Feldblyum, Candidate of Medical Sciences M. K. Indulen;

--for the collective monograph "Faktory i motivy demograficheskogo povedeniya" [The Factors and Motives of Demographic Behavior] (Institute of Economics) to Candidate of Geographical Sciences P. A. Eglita, Candidate of Economic Sciences I. V. Zarinysh, Candidate of Economic Sciences A. A. Tsitsa.

Second Prize

--for the monograph "Avtomatizatsiya proizvodstva sredstvami EMAGO" [The Automation of Production by Means of EMAGO] (Institute of Physics) to Candidate of Technical Sciences E. P. Davydenko, Candidate of Technical Sciences A. S. Kanayev;

--for the series of works "The Development of Technologies of the Purification and the Growing of Crystals of Organic Compounds of Various Classes" (Physics and Power Engineering Institute) to Candidate of Physical Mathematical Sciences S. B. Aleksandrov, engineer G. F. Grishina, senior engineer S. V. Titarenko;

--for the work "The Development of the Third-Generation Microprocessor Measuring and Control System for Stations of the Laser Detection and Ranging of the Moon" (Institute of Electronics and Computer Technology) to Candidate of Technical Sciences Yu. N. Artyukh, Candidate of Technical Sciences V. A. Bespalko, group chief S. B. Bondar;

--for the series of works "The Electron Structure and Properties of 8-Derivatives of Quinoline and Their Chelates" (Institute of Inorganic Chemistry) to Candidate of Chemical Sciences I. V. Zuyka, Candidate of Chemical Sciences Z. P. Bruvers;

--for the work "Interphase Catalysis in the Chemistry of Nitrogen- and Oxygen-Containing Heterocycles and Their Organoelemental Derivatives" (Institute of Organic Synthesis) to Candidate of Chemical Sciences Yu. Sh. Goldberg, Doctor of Chemical Sciences M. V. Shimanskaya, Corresponding Member E. Ya. Lukevits;

--for the work "The Birds of Latvia. Territorial Distribution and Population" (Institute of Biology) to Candidate of Biological Sciences A. V. Viksna, Candidate of Biological Sciences Ya. A. Baumanis, Candidate of Biological Sciences A. A. Mednis;

--for the series of works "The Obtaining of Cultures of Cells, Which Produce the Virus of Cattle Leukemia (VLKRS), and Their Use in Virology" (Institute of Microbiology imeni Avgust Kirkhenshteyn) to Doctor of Medical Sciences L. I. Nagayeva, Candidate of Medical Sciences O. I. Bratsslavskaya, Junior Scientific Associate Ya. S. Ilina;

--for the work "Letters From the Front" (Institute of History) to Candidate of Historical Sciences A. V. Udris (compiler);

--for the monograph "Zhilishcha Rigi XII-XIV vv." [Dwellings of Riga of the 12th-14th Centuries] to Candidate of Historical Sciences A. V. Tsauna.

Third Prize

--for the monograph "Osnovy teorii i rascheta ustroystv s begushchim magnitnym polem" [The Principles of the Theory and Design of Devices With a Traveling Magnetic Field] to Candidate of Physical Mathematical Sciences Yu. K. Krumin;

--for the series of works "The Study of Low-Frequency Excitations in Condensed Media by the Method of High-Resolution Mossbauer Diffraction Spectroscopy" (Institute of Physics) to Doctor of Physical Mathematical Sciences Ye. M. Iolin, Candidate of Physical Mathematical Sciences E. V. Zolotoyabko;

--for the series of works "The Development of the Scientific Principles of the Design of Flywheels Made of Composites" (Institute of Polymer Mechanics) to Candidate of Technical Sciences G. G. Portnov;

--for the series of articles "The Glycerides of Primary Aliphatic Monocarboxylic Acids and Their Use for Obtaining Heat-Insulating Foam Plastics" (Institute of Wood Chemistry) to Junior Scientific Associate A. R. Akermanis, Junior Associate D. P. Zeltyna, Junior Scientific Associate V. Ya. Zeltinsh;

--for the series of works "The Directed Transformation of Beta-Lactam Antibiotics" (Institute of Organic Synthesis) to Candidate of Chemical Sciences G. A. Veynberg, Candidate of Chemical Sciences A. M. Kats, Candidate of Chemical Sciences L. N. Petrulyanis;

--for the series of works "The Enrichment of Lignocellulose Materials With Protein by the Direct Cultivation of Microorganisms" (Institute of Microbiology imeni Avgust Kirkhenshteyn) to Candidate of Biological Sciences A. F. Apsita, senior engineer S. V. Strikauska, senior microbiologist A. Ya. Apina;

--for the series of works "The Introduction, Strain Testing and Agricultural Technology of Narcissuses in Latvia" (Botanical Garden) to Junior Scientific Associate A. Ya. Vasila;

--for the monograph "Ekonomicheskiye problemy sotsialisticheskogo sorevnovaniya" [The Economic Problems of Socialist Competition] (Institute of Economics) to Doctor of Economic Sciences I. Kh. Kirtovskiy, Candidate of Economic Sciences L. A. Bazhenova (Leningrad Institute of Motion Picture Engineers);

--for the monograph "Ideologiya levogo radikalizma. Kriticheskiy analiz kontseptsii G. Markuze" [The Ideology of Left-Wing Radicalism. A Critical Analysis of the Conception of H. Marcuse] (Institute of Philosophy and Law) to Candidate of Philosophical Sciences Yu. I. Prikulis.

2. The 1984 prizes of the Presidium of the Latvian SSR Academy of Sciences for young scientists of the academy were awarded for the following scientific research works and the development of instruments for scientific research:

--for the series of works "The Development of Protocols and Methods of the Analysis of the Procedures of Data Transmission of Computer Networks" (Institute of Electronics and Computer Technology) to Candidate of Technical Sciences S. V. Rotanov;

--for the series of works "The Development of Instruments for the Nondestructive Testing of Metal and Composite Platings" (Physics and Power Engineering Institute) to Junior Scientific Associate Ya. E. Silinsh;

--for the series of works "The Study of the Mechanical Properties and Process of the Destruction of Polymeric Film Materials" (Institute of Polymer Mechanics) to Junior Scientific Associate I. V. Grushetskiy;

--for the series of articles "Experimental and Theoretical Model Studies of the Permolecular and Conformational Structure of Lignin" (Institute of Wood Chemistry) to Junior Scientific Associate B. A. Anderson, graduate student Yu. K. Yakobson;

--for the series of works "The Mineral Nutrition of Poinsettia in Various Soil Substitutes Under the Conditions of the Latvian SSR" (Botanical Garden) to agromonist D. K. Grivina;

--for the work "Equipment for the Automation of Microbiological Research" (Institute of Microbiology imeni Avgust Kirkhenshteyn) to senior engineer A. V. Tyuterev;

--for the series of articles "The Study of Lettish Toponymy" (Institute of Language and Literature) to Junior Scientific Associate L. V. Baloda;

--for the elucidation of the philosophical problems of the interrelationship of society and nature in the book "Priroda v obshchestve" [Nature in Society] and in a number of other publications (Institute of Philosophy and Law) to Junior Scientific Associates Ya. A. Broks and I. Ya. Rozenvalda.

3. The presidium also awarded the 1984 prizes of the Latvian SSR Academy of Sciences for the best works of undergraduates of the higher educational institutions of the republic. These prizes were awarded to undergraduates of

the Latvian State University imeni Petr Stuchka--A. R. Muyzhniyeks, M. A. Raugulis, N. V. Nekrasova, V. Ya. Grakholskaya, A. A. Pilka, S. V. Veytse, I. A. Medne, A. A. Villa; undergraduates of Riga Polytechnical Institute imeni Arvid Pelshe--A. A. Matveyev, M. F. Utinans; the graduate of the Latvian Agricultural Academy M. G. Markots; the undergraduates of Riga Medical Institute T. N. Kurenkova and V. A. Pomazanov.

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GENERAL

ACADEMICIAN OVCHINNIKOV ON GAINS, PROBLEMS OF APPLIED SCIENCE

Moscow SOVETSKAYA ROSSIYA in Russian 29 Jun 85 p 1

[Article by Vice President of the USSR Academy of Sciences Academician Yu. Ovchinnikov: "The Practical Impact of Science"]

[Text] In the accomplishment of the tasks of the intensification of social production and the utmost increase of the efficiency of our economy a decisive role belongs to science. The task has been posed: it is necessary to shift from the evolutionary trend of scientific and technical progress, which is occurring in the majority of sectors of the national economy, to revolutionary changes--to fundamentally new technological systems and to the latest equipment, which is capable of yielding the greatest efficiency. The retooling of all sectors should be accomplished on the basis of the modern achievements of science and technology. Hence the requirement of the times--to achieve the world levels of scientific and technical progress in all the basic directions.

Modern man has achieved the most significant results. He has done much in the conquest of the depths of the earth and the mastering of the world ocean and has gone into space. The energy of the atomic nucleus and gene engineering have come under his power, the mystery of many diseases and ailments has been solved. But the problems, which today's mankind faces, have by no means become less complicated. The growing population of the earth has actually been confronted with a shortage of food and energy resources; the questions of environmental protection have become extremely urgent, new advanced technical systems were needed in production, transportation and the sphere of information and communications.

Soviet scientists have something to be proud of. The Energy Program, in the formulation of which the USSR Academy of Sciences actively participated, is being implemented. Significant gains have been made in the development of electric machines of high unit power. A fundamentally new power-generating unit with a magnetohydrodynamic generator is being built at the Ryazanskaya GRES. Modern nuclear electric power plants are being built, the construction of the new "Rossiya" nuclear-powered vessel is being completed. Scientists are making a large contribution to the implementation of the USSR Food Program. The problems of the increase of the yield of fields and the productivity of animal husbandry, the chemicalization, mechanization and

automation of agricultural production and the decrease of the losses of products are being worked on by specialists of many scientific institutions of different types. For example, moisture meters were developed at the Institute of Radio Engineering and Electronics of the USSR Academy of Sciences. Installed on board an airplane, these instruments efficiently gather data on the moisture content of soils and the level of ground waters on vast expanses of fields. Chemistry is playing an important role in the development of the agroindustrial complex, as of other sectors of the national economy. At present much is being done for the rapid development of this field of science, particularly the development of effective means of protecting agricultural plants and animals against weeds, pests and diseases.

Appreciable gains have been made in biology and biotechnology. The production of food protein by means of microbiological synthesis, including on the basis of natural gas (methane) and methanol, is being expanded. By means of genetic engineering technology it has become possible to obtain on a commercial scale such valuable preparations as interferon, insulin and growth hormone, to make directed changes of a living cell and its hereditary system and to develop new strains of plants and breeds of animals. Effective techniques of the production of vaccines and diagnosticums for the combating of viral diseases have been developed.

In short, the gains in the development of domestic science and in the acceleration of scientific and technical progress are unquestionable. But life is moving forward, it is also posing for us, scientists, new important tasks. And that is why today all our thoughts are not about the gains, but about the responsible and difficult tasks facing Soviet science. Given all the enormous scale of scientific research and given the mighty scientific and technical potential of the country the influence of science on technical progress in the sectors of the national economy and on the rate of intensification of the economy is still quite inadequate.

"The front line of the drive for the acceleration of scientific and technical progress passes through science," M. S. Gorbachev stressed at the conference in the CPSU Central Committee. "At the same time we should look at the tasks of science through the prism of the requirements of the times--the requirements of the resolute turn of it toward the needs of social production and of production toward science. From this standpoint all the links of the chain, which unite science, technology and production, should be analyzed and strengthened."

The problem of ensuring the acceleration of scientific and technical progress should be worked on collectively. It is necessary to improve organization and management, ensuring the concentration of efforts on the most urgent problems, to increase the potential of science, strengthening the material and technical base and improving the training of personnel, and to regulate the material and moral stimulation of scientists and specialists. The leading development of basic research, it was noted at the conference in the CPSU Central Committee, is the most important condition for the acceleration of technical progress. Precisely it acts as a generator of ideas, opens holes into new areas and provides an outlet to a new level of efficiency. And here it is necessary to increase the role of the Academy of Sciences, to make a sharp turn in the

direction of the expansion of the research which has a technical orientation and to improve radically the system of the practical implementation of the achievements of science and technology.

An interest of ministries and industrial enterprises in the introduction of innovations is needed first of all for the rapid and extensive practical use of scientific results. Most often the present system of the management of scientific and technical progress is an insurmountable obstacle in the way of introduction. The introduction of jobs, which affect the interests of several departments, proves to be especially complicated. Thus, while having an unlimited amount of nepheline raw materials, to date we have not assimilated the process of obtaining cement from these raw materials, which was developed about 15 years ago. Now, it is true, steps are being taken on the establishment of intersectorial cooperation on the Kola Peninsula, but for the present it is premature to speak of the results.

Or let us take another example. An inhibitor for the protection of metals from corrosion in environments containing hydrogen sulfide and carbon dioxide was developed at the Academy of Sciences. The preparation does not have analogues. In its effectiveness it is significantly superior to foreign corrosion inhibitors. But, in spite of the great interest in the new preparation on the part of enterprises of the petroleum and gas industry, the Ministry of the Chemical Industry and the Ministry of the Petroleum Refining and Petrochemical Industry never organized its production during either the 10th or 11th Five-Year Plan. But it is necessary merely to implement a simple flow chart on the basis of domestic raw materials which are not scarce.

For more than 10 years the Ministry of the Chemical Industry has not found the opportunity for the introduction of the technological process, which was developed by scientists, of obtaining high molecular polyethylenimine, which is used extensively in the production of paper and construction materials, in electroplating, in the rubber industry and in medicine. As a result we have been forced to purchase this preparation abroad. Unfortunately, such cases will amount to quite a few. A unique development of physicists--a device for the continuous mass spectrometric monitoring of the converter production of ferrous and nonferrous metals--is being introduced intolerably slowly. Only 10 percent of the needs of the national economy for bearings made from antifriction materials are being met. But their use makes it possible to save a good deal of scarce alloyed steel, nonferrous metals and lubricants. Behind each of these examples there are millions of rubles of underived profit and unused levers of the increase of labor productivity.

The strengthening of the contact of science with production, particularly of academic scientific institutions with sectorial organizations and with production enterprises, is an important condition of the increase of the effectiveness of research and development. Many years of experience show that given such cooperation introduction also occurs more rapidly. During the years of the 11th Five-Year Plan about 1,400 results of the research and development of scientists of the USSR Academy of Sciences became accessible to practice. The figure is impressive, but it should not be an occasion for reassurance. The time of introduction on the average still remains very long.

There are also other means of the rapid use of scientific and technical developments in the national economy. In a large number of cases the assimilation of new equipment and technology takes place within the goal and comprehensive programs of the USSR State Committee for Science and Technology, the Academy of Sciences and the USSR State Planning Committee. This is conducive to the uniting of scientific forces, including specialists of the higher school, and material resources on the solution of the most important scientific and technical problems. But here, too, the results cannot always satisfy. The goal program method of planning scientific and technical progress should be improved.

The question of the practical implementation of the achievements of science is an extremely urgent and topical one, which requires effective settlement. This will require considerable efforts, and we scientists are obliged to take a most active part in this. The instructions of the April (1985) CPSU Central Committee Plenum on the establishment of order and the tightening up of discipline at all levels also apply utterly and completely to the sphere of science. We will have to think over thoroughly the organization of science, eliminate resolutely the unnecessary units and subdivisions in the management of science, put an end to "scientific" paper work, establish complete order in the work of our institutions and tighten up the discipline of labor of scientists and specialists in the broadest sense of this word, at all the stages of its organization and performance. All the organization of scientific research should be of the nature of a well-balanced system and be carried out at a high qualitative level. We need to strive for the truly specific and practical coordination of scientific research and--first of all--between the immediate participants in the work. It is necessary to [illegible] effect barriers against work on minor themes, personal tastes and interests in the determination of the themes of scientific operations and against their unjustified duplication.

Such a task as the careful revision of the network of scientific institutions and organizations, which has formed over the course of many years, for the purpose of eliminating the unnecessary and unproductive ones has also been posed today for the USSR Academy of Sciences. It is also necessary to establish complete order in the training of scientists, to strive for clear agreement in this matter between different departments and to constantly improve their qualitative composition. Finally, it is very important to strengthen the material and technical base of science and to distribute more efficiently the resources being allocated by the state. In all these problems, which require a thorough and thoughtful solution, our work in all directions requires consistency of aim, good organization, a realistic approach and efficiency, the full exertion of all efforts.

The horizons of scientific and technical progress are broad. Its potentials are imposing. Our foremost task is to strive step by step for its utmost acceleration and the efficient use of its results.

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GENERAL

THEMES FOR LECTURES, REPORTS ON S&T PROGRESS LISTED

Tallinn SOVETSKAYA ESTONIYA in Russian 26 Jun 85 p 3

[Article: "Approximate Themes of Lectures, Reports and Discussions on Questions of the Acceleration of Scientific and Technical Progress"]

[Text] The acceleration of the socioeconomic development of the country is a task of prime importance.

A fundamental question of party economic policy.

The acceleration of scientific and technical progress is a requirement of life.

Achieve greater gains with fewer expenditures.

Urgent problems of the reform of investment and structural policy.

The retooling of enterprises is a most important task.

What is being done at our enterprise on the mechanization of labor-consuming processes?

The renovation of operating enterprises is a most important direction of technical policy.

Use natural resources and raw materials efficiently and completely in every labor collective.

The policy of economy is a partywide, national affair.

How are the assignments on saving being fulfilled in our labor collective?

The saving of resources is one of the main directions of investment policy.

The tasks of capital construction in light of the requirements of scientific and technical progress.

The key role of machine building in the realization of the scientific and technical revolution.

Modern technology is an important link of scientific and technical progress.

The information science industry is a catalyst of scientific and technical progress.

The expansion of production and the improvement of the quality and use of modern materials are an indispensable condition of the increase of the efficiency of the national economy.

Foreign trade and its influence on the efficiency of the economy.

The export products of our plant.

Product quality is an objective indicator of scientific and technical progress, the standards and discipline of labor.

The struggle for the honor of the Soviet mark is the affair of every enterprise and every worker.

Science is a mighty productive force of society, the front line of the campaign for the acceleration of scientific and technical progress.

The improvement of the forms of the integration of science, technology and production.

The most important task of basic science.

Science of the higher educational institution is an important reserve of the acceleration of scientific and technical progress.

The acceleration of scientific and technical progress is the patriotic duty of scientists, engineers and technicians.

The tasks of inventors and efficiency experts on the acceleration of scientific and technical progress.

Ways of improving the economic mechanism.

The strengthening of cost accounting, economic levers and stimuli is an important national economic task.

Make the remuneration of labor dependent on the results of the work of the collective.

The development of the brigade forms of the organization of labor in our collective.

Great public recognition for scientific and engineering labor.

The decisive role of the human factor in the acceleration of scientific and technical progress.

To concentrate the attention of personnel on the acceleration of scientific and technical progress is the main aim of party work under present conditions.

Improve the style of work, increase the demandingness on personnel.

The vanguard role of communists in the acceleration of scientific and technical progress.

Firmly establish an atmosphere of creative labor, develop in every possible way the initiative of the working people.

The energy and inquisitive mind of young people in the service of scientific and technical progress.

Means and methods of the ideological support of the acceleration of scientific and technical progress.

The increase of the well-being of the people is the highest point of the activity of the CPSU.

Extensive housing construction and the development of health care, education, science and culture are the main directions of the socioeconomic policy of the CPSU.

The increase of the military threat on the part of imperialism and the need for the strengthening of the defensive capability of the country.

The struggle for the strengthening of order and organization in all spheres of our life is a permanent task of party organizations and labor collectives.

The lively creative work of the people is a guarantee of the successful settlement of the fundamental questions of party economic policy.

We will successfully fulfill the 1985 plan and the assignments of the five-year plan as a whole!

A worthy greeting for the 27th CPSU Congress!

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GENERAL

COLLECTION OF DOCUMENTS ON SCIENTIFIC, TECHNICAL SOCIETIES

Moscow AKTIVU NAUCHNO-TEKHNICHESKIKH OBSHCHESTV: SPRAVOCHNOYE POSOBIYE in Russian 1984 (signed to press 22 Jun 84) pp 1, 279-287

[Annotation and table of contents from book "To the Aktiv of Scientific and Technical Societies: A Reference Manual", compiled by N. N. Gritsenko, Ye. A. Pirogov, S. V. Pryanichnikov, V. N. Shvedov, M. I. Dzliyev, V. N. Zhuravlev, N. N. Potrubach, V. I. Marunin and I. A. Nesterov, Profizdat, 70,000 copies, 288 pages]

[Text] Official materials on the basic sections of the work of scientific and technical societies are placed in the collection. Changes and additions, which follow from the decisions of the 26th CPSU Congress, the 18th Congress of USSR Trade Unions, the 6th All-Union Congress of Scientific and Technical Societies, as well as the decrees of the All-Union Central Council of Trade Unions and the All-Union Council of Scientific and Technical Societies, which were adopted after the publication of the book in 1979, have been made in this edition.

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BIOGRAPHICAL INFORMATION

ALEKSANDR STEPANOVICH VECHER OBITUARY

Minsk SOVETSKAYA BELORUSSIYA in Russian 7 May 85 p 4

[Article: "Aleksandr Stepanovich Vecher"]

[Text] On 4 May 1985 Academician of the Belorussian SSR Academy of Sciences, Doctor of Biological Sciences Professor Aleksandr Stepanovich Vecher, a prominent Soviet biochemistry scholar, a member of the Bureau of the Biological Sciences Department of the Belorussian SSR Academy of Sciences, chief of a laboratory of the Order of Labor Red Banner Institute of Experimental Botany imeni V. F. Kuprevich of the Belorussian SSR Academy, Honor Figure of Science and Technology of the Belorussian SSR and a member of the USSR Union of Writers, died in his 81st year of life.

A. S. Vecher was born on 25 March 1905 in the village of Mashchitsa of Slutskiy Rayon of Minsk Oblast in a peasant family. In 1929 he graduated from the Belorussian Agricultural Academy, and then completed graduate studies. From 1930 to 1937 he worked as an instructor of the Gorodok Tekhnikum of the Mechanization of Agriculture, an agrochemist of the zonal testing station and director of a department of the Belorussian SSR Scientific Research Institute of the Food Industry. During 1937-1959 he worked as the chief of a chair of the Kuban Agricultural Institute, which was then reorganized into the Krasnodar Institute of the Food Industry.

In 1959 A. S. Vecher was elected chief of the Department of Plant Biochemistry of the Institute of Biology of the Belorussian SSR Academy of Sciences, now the Institute of Experimental Botany imeni V. F. Kuprevich. In 1959 he became a corresponding member of the Belorussian SSR Academy of Sciences and in 1966 a academician of the Belorussian SSR Academy of Sciences.

A. S. Vecher made a large contribution to the development of basic and applied research in the field of plant biochemistry, biotechnology and molecular biology and to the training and education of skilled scientists and specialists of the national economy. He founded the Belorussian school of biochemists, many students of his became doctors and candidates of sciences. He was the author of 500 scientific works, including 12 monographs. More than 20 of his developments are protected by certificates of authorship and have been introduced in the practice of the national economy.

A. S. Vecher devoted much effort and energy to scientific organizational and community work. He was one of the organizers of the republic Biochemical Society and was a member of a number of scientific councils and editorial boards of academic journals and other scientific publications.

At the same time A. S. Vecher engaged in literary activity. Original poetic works, including the collections of poems "Kola dzen" and "Zvarot da slova," were penned by him.

All the conscious life and activity of A. S. Vecher are a vivid example of devoted service to science. An unusual capacity for work, benevolence, modesty and simplicity in relations, humane charm and a great sense of duty were combined in his person.

The Communist Party and the Soviet Government appreciated the labor services of A. S. Vecher, having awarded him the Order of Friendship of Peoples, medals and honorary certificates of the Belorussian SSR Supreme Soviet.

The blessed memory of Aleksandr Stepanovich Vecher, a prominent scientist and organizer of science, a man with a big heart, will remain forever in the hearts of everyone who knew him and worked together with him.

[Signed] N. N. Slyunkov, I. Ye. Polyakov, V. I. Brovikov, G. G. Bartoshevich, V. G. Baluyev, N. I. Dementey, M. V. Kovalev, Yu. B. Kolokolov, A. T. Kuzmin, M. I. Lagir, V. A. Lepeshkin, A. A. Malofeyev, V. A. Mikulich, N. N. Polozov, Yu. M. Khusainov, I. F. Yakushev, V. I. Kritskiy, N. N. Mazay, N. A Borisevich, Yu. P. Smirnov, I. I. Antonovich, Ye. I. Skurko (M. Tank), Tarazevich, V. A. Pechennikov, A. A. Sanchukovskiy, A. S. Makhnach, V. A. Belyy, A. S. Dmitriyev, I. Ya. Naumenko, V. A. Pilipovich, L. I. Kolykhan, L. M. Sushchenya, L. V. Khotyleva, V. I. Parfenov, M. N. Goncharik, N. A. Dorozhkin, I. D. Yurkevich.

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